INDUSTRY & WELDING

MARCH 1957

American Welding Society honors Comfort Avery Adams ... founder and first president

New Arc Process Speeds Welding.....44
Review of Inert Arc Welding (Stainless)....54
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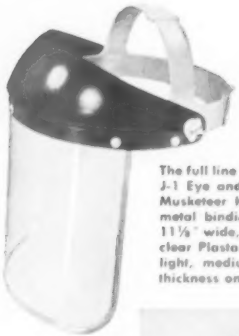
See Contents Page for Other Features

AN INDUSTRIAL PUBLISHING CORPORATION MAGAZINE

Musketeer
+ new
FIBER VISOR with WELDING LENS

For use in scarfing and furnace work, heavy gas welding and cutting, this vulcanized fiber shield, 6⅝" deep, holds filter lens of desired shade and cover glass in insulative lens holder of high-impact resistant thermosetting plastic.



Musketeer
+ new
METAL-BOUND PLASTIC VISORS

The full line of visors as made for the long popular type J-1 Eye and Face Shield are now available with the Musketeer Headgear. Much improved with a sturdy metal binding, they hold their desired shape. Made 11½" wide, in depths of 4, 6, and 8 inches (shown) in clear Plastacele .020", .030" and .040" thick, and in light, medium, and dark green Plastacele in .020" thickness only.

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Headband and cross strap, both adjustable to size, are molded in one piece of lightweight, nonconductive Nylon. Headband adjustment is made by a large, easy to handle winged knob and gear, also of Nylon, while wearing the shield; enclosed mechanism is smooth against the head. A cork-padded sweatband is optional at extra cost.

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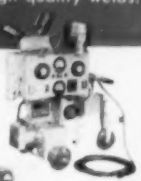

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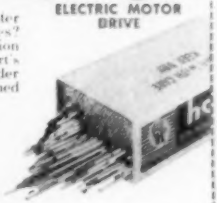

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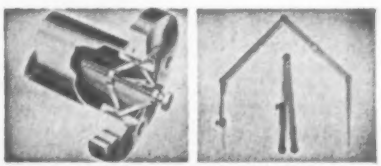

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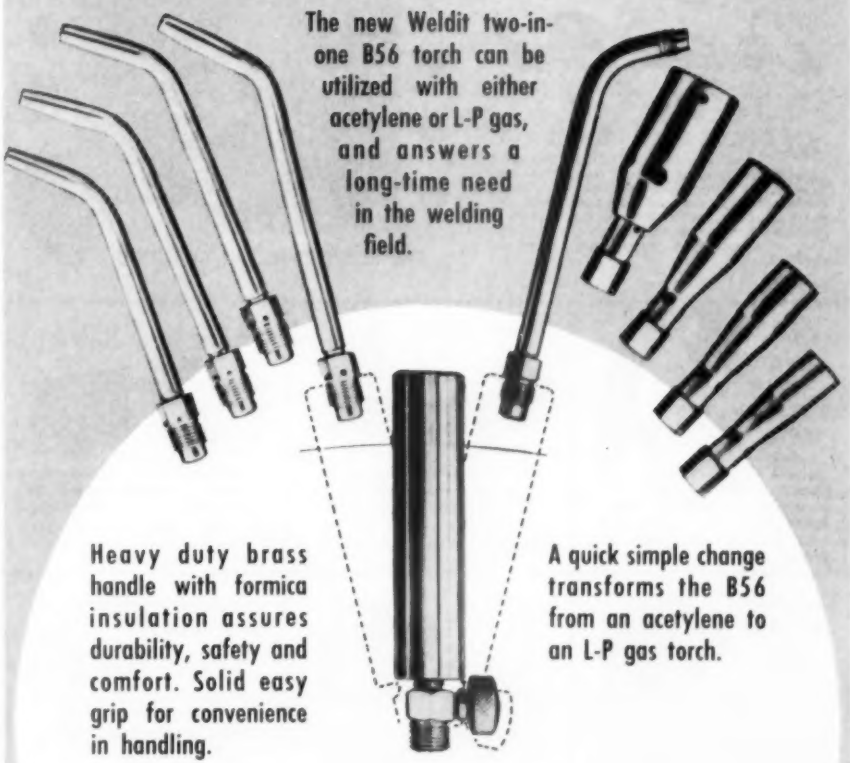

The new Weldit two-in-one B56 torch can be utilized with either acetylene or L-P gas, and answers a long-time need in the welding field.

Heavy duty brass handle with formica insulation assures durability, safety and comfort. Solid easy grip for convenience in handling.

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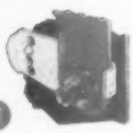
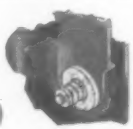
4-POSITION ADJUSTABLE HELMET STOP 5



Positions helmet for overhead and vertical welding. Positive stop, easily adjustable to any of 4 positions without tools. Allows normal raising of helmet on friction joints.

LONG-LASTING FRICTION JOINTS 6



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MARCH 1957 - VOL. 30 - NO. 3

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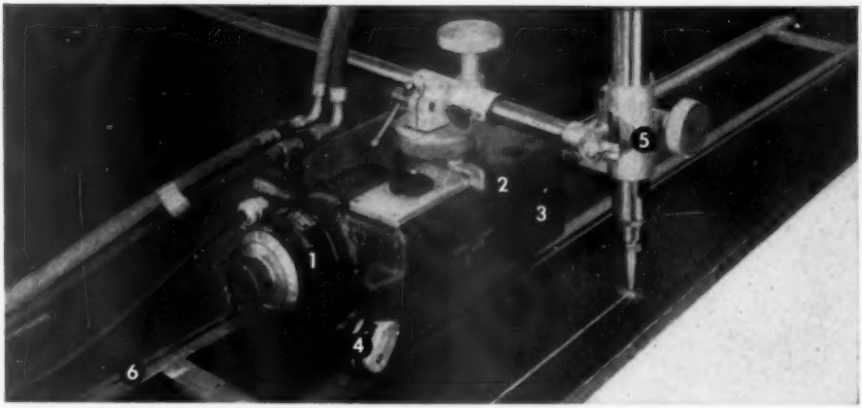

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The #10 Radiagraph is a portable (43 lb.) gas cutting machine designed to cut metals up to 6" thickness. It will cut straight lines of any length, circles from 3" to 85" diameter, arcs up to a radius of 42½"—all with square or beveled edges. Designed to provide the greatest degree of cutting accuracy and convenience of operation the husky overall construction of the #10 has made it an indispensable tool wherever steel is to be cut to size for fabrication. Here are a few of the quality details that don't meet the eye:

1. *Governor Control Variable Speed Motor* puts the entire speed range (4 to 50 ipm) at operator's fingertips. An indicator showing all speed settings is provided. Speed can be increased or decreased while cutting is in progress . . . speed is not affected by load or voltage changes.

2. *Clutch Lever* allows the machine to be rolled freely in either direction. This feature is a time-saver when aligning the machine with work.

3. *Drive Shaft* (under housing) runs on replaceable needle bearings which reduce friction to a minimum and affords a maximum of free motion.

4. *Caster Wheels* run in a machined groove in track for greater machine stability and more accurate cutting.

5. *Torch Holder Assembly* is made of brass forgings which withstand more abuse than castings and have greater corrosion resistance than iron or steel.

6. *Track* is cold rolled steel with two machined grooves in which wheels travel, and has track sections with tongue or grooved joints for correct alignment when multiple lengths are used for progressive cutting. Airco oxyacetylene shape cutting machines include the Airco Camograph, Monograph, Duograph, Oxygraph and Travograph. Write today for literature.

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NCG "Type R" cutting machines—3 of them—help speed production at the WHITING CORPORATION, Harvey, Ill., one of the nation's leading producers of foundry and railway equipment, material handling equipment, chemical equipment, and special machinery. Two machines, shown above, are mounted on one table to provide a 40-foot cutting length.

MERCURY MANUFACTURING CO., Chicago, uses this NCG "Type JR" machine for close tolerance shape cutting of parts for their well known "Mercury" fork-lift trucks.

"We'd be lost without our CUT-O-MATIC" says Ralph Long of J & L ENGINEERING CO., Chicago. "We use it for everything."

Bring on ANY flame cutting job!

Do you do large scale cutting . . . large in size or large in quantity?

Then the NCG "Type R" is the machine for you. It lets you mount up to 8 torches at once for tremendous output. It cuts shapes up to 10 feet in diameter . . . as small as 1½ inch in diameter. A beveling device can be added for making accurate bevels of all types on plate up to 2½ inches thick. Since the "Type R" is built to order, any of its eight standard forms can be varied if necessary to meet your exact needs—and varied later, too, to meet changing needs. And it will give you long dependable performance: the first "Type R"—installed more than fifteen years ago— is still in service.

Do you need fast, accurate cutting on a medium scale?

If so, it will pay you to get the facts about the NCG "JR" cutting machine. A junior version of the big "Type R," it handles any cutting job you can think of—straight line or shapes, manual or template tracing—on plate up to 3 x 4 feet.

Do you want to mechanize hand cutting operations?

Then ask for a demonstration of the CUT-O-MATIC®—an inexpensive portable cutting machine that weighs just 30 pounds, complete with torch. It cuts circles, arcs, straights, does stack cutting, pipe cutting . . . all with production-line accuracy. An exclusive "floating torch" assembly lets you cut accurate bevels even on wavy plate.

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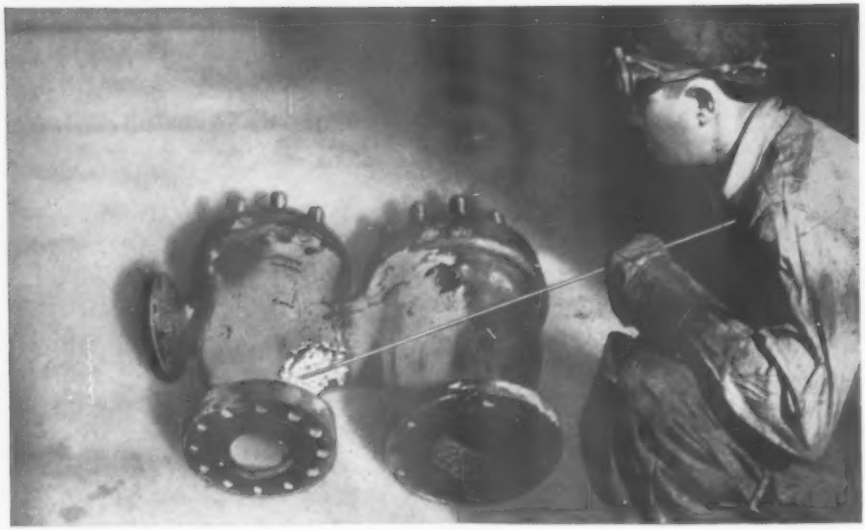

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...get stronger welds faster with Bridgeport No. 192 Low-Fuming Bronze Rod

A cast steel valve chamber, controlling fluid from a 1200 psi pump, spelled shutdown for an entire operation when it developed a crack. Instead of replacing the unit at considerable expense in both money and time, a shop welder repaired it quickly, cheaply and permanently with Bridgeport No. 192 Low-Fuming Bronze Rod.

Bridgeport No. 192—recommended for all-purpose welding—is a low-fuming manganese-type rod that tins readily with only local preheating. Because the temperature of the surrounding metal requires relatively little preheating, brittleness is avoided. This also means a saving in gas and labor, and often produces a weld stronger than the base metal.

You can have the whole money-saving story of Bridgeport No. 192 Low-Fuming Bronze Rod and other Bridgeport Alloys in our new booklet, "Bronze Welding—Modern Tool of Industry." Write for your free copy today.

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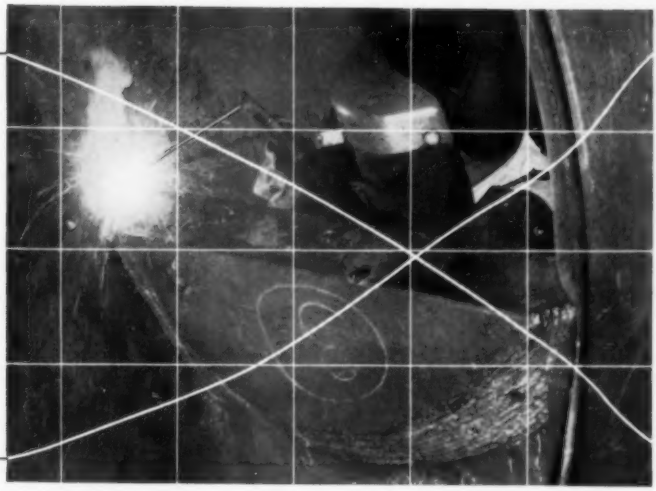

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Service Life Up

NEW IRON POWDER HARD SURFACING ALLOYS

INCREASE DEPOSITION RATES — EXTEND PART LIFE

Longer wearing deposits and shorter down time increase efficiency of maintenance.

Every consumer of hard surfacing and build-up alloys desires an electrode having faster deposition rates and longer wearing deposits in order to shorten down time and increase overall operating efficiency. Here are three *new* iron powder hard surfacing electrodes designed to provide economies and quality of weld metal never before possible in hard surfacing operations.

Faster Deposition Rates

Because of the iron powder in the coating, higher welding currents may be used, thereby depositing more pounds of weld metal per hour. Greater deposition efficiencies are achieved because the iron powder serves as an additional source of weld metal.

Longer Wearing Deposits

Most hard facing alloys dilute heavily with the base metal on the first pass because of penetration. Although higher currents are used with these iron powder alloys, there is actually less penetration of the base metal because the added electrical energy is consumed in melting the iron powder rather than in disturbing the base metal. This provides a dense, porosity free higher alloy deposit ensuring longer part life.

Greater Ease of Application

Weldors will enjoy the smooth, easy to control arc characteristics of these new iron powder alloys. Spatter is practically eliminated and weldor fatigue is lessened to a point where you will see the gain in pounds of weld metal deposited.

Wear-Arc 3—I. P.

An iron powder low hydrogen build-up alloy for all weldable grades of carbon steel. This alloy has outstanding physical properties and provides an excellent base for hard surfacing deposits.

Wear-Arc 6—I. P.

An iron powder low hydrogen hard surfacing alloy for all position application. Designed for resistance to wear caused by severe abrasion in combination with heavy impact.

Wear-Arc 12—I. P.

An iron powder low hydrogen hard surfacing alloy for resisting wear caused by severe impact and abrasion.

Wear-Arc Iron Powder to be introduced and demonstrated live for first time at AWS Show . . . Booth 101—April 9, 10, 11, Convention Hall, Philadelphia, Penna. If you rebuild or hard surface worn equipment parts, Booth 101 will be your most profitable "spot" at the show.

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WELDING ROD CLINIC

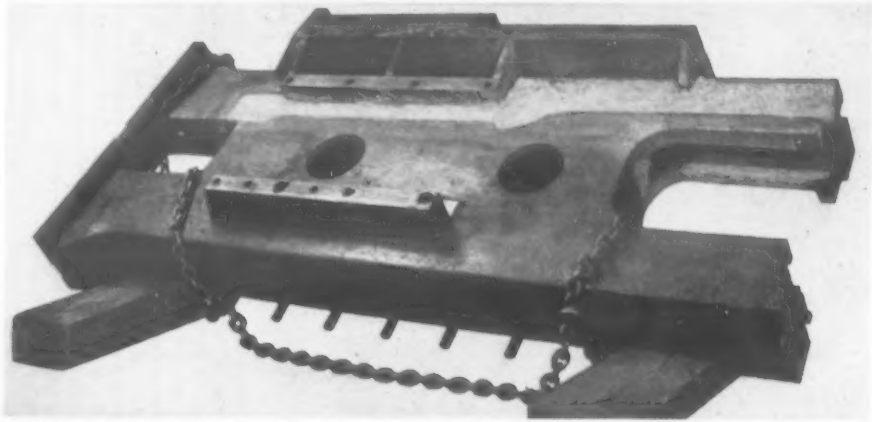
J. Imperati and R. F. Pulver, Welding Engineers
The American Brass Company, Waterbury, Conn.

Braze Welding is virtually foolproof for cast iron repairs

Low temperatures used give strong and enduring welds

The major obstacles to successful repair welding of cast iron are the low strength and poor ductility of cast iron weld metal, and the embrittlement and hardening produced by rapid cooling from welding temperatures.

Oxyacetylene fusion welds with cast iron rods have such very low strength and ductility that they often crack under the stresses imposed during welding and cooling. If they survive these hazards, they sometimes fail when subjected to the service stresses that caused the original failures.



A 7-foot fracture in this 6-ton press was repair welded in three days—20 hours preparation, 48 hours oxyacetylene welding time, using 400 lb. of Tobin Bronze-481 Welding Rod.

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On the other hand, severe embrittlement and hardening of weld and adjacent base metal are easily developed in arc welding because of the steep temperature gradients from weld to base metal. Here also, failure can occur during welding and cooling, or later in service. Usually the weld area is extremely hard and not machinable. It is often necessary to resort to extensive preheating, peening, post-heating, and annealing to avoid these twin evils.

Oxyacetylene braze welding is an excellent solution to the problem for two reasons. With the low temperatures required, there is no rapid cooling from high temperatures and therefore no embrittlement. Excellent ductility and high strength of the weld metal deposited by Tobin Bronze-481, Anaconda-997 (Low Fuming) Bronze, and Nickel Silver-828, permit yielding while the repairs are being made and after they are returned to service, and the danger of failure is practically eliminated.

The braze-welding operation itself is virtually foolproof because the molten bronze automatically "tins out" or spreads over the joint surfaces when the correct temperature is reached. Since the base metal is not melted, control of the weld metal is very easy. Braze welding is readily done in all positions.

ADVANTAGES OF BRAZE WELDING WITH ANACONDA RODS ARE:

1. **Economy in welding time** and gas consumption.
2. **Development of low residual stresses** with less distortion and less tendency to crack.
3. **No embrittlement,** and complete machinability of the weld areas.
4. **Minimum delay** in returning the repaired parts to service.

DETAILED INFORMATION AVAILABLE

Detailed suggestions on the methods of chipping grooves, removing oil, positioning the work, and preheating are given in Publication B-13. This 32-page book gives a complete description and full information on Anaconda Welding Rods and discusses procedures for welding with copper and copper alloys in a wide variety of applications.

These are some of the subjects covered: Copper-Alloy Welding Rods in steel sheet metal work, brazing and soldering, resistance welding, surfacing, welding copper alloys to steel, arc-welding of copper and copper alloys.

For information on special problems—or for a copy of Publication B-13—write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

57109

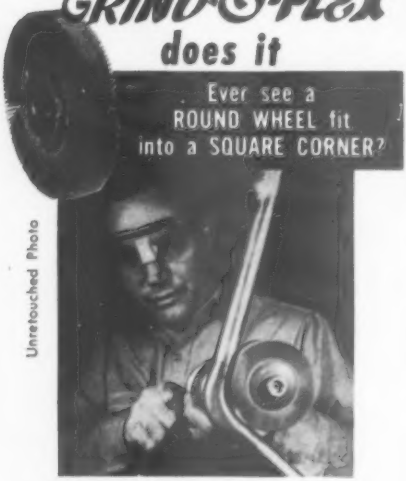
WELDING ROD	APPROX. COMPOSITION, %	APPROX. MELTING POINT	
		Deg. C	Deg. F
Tobin Bronze-481	59 copper, 0.60 tin, 40.40 zinc	885	1625
Anaconda-997 (Low Fuming) Bronze	57.80 copper, 40.27 zinc, 0.95 tin, 0.85 iron, 0.10 silicon and 0.03 manganese	870	1598
Nickel Silver-828	48.58 copper, 41 zinc, 10.25 nickel, 0.15 silicon, 0.02 phosphorus	930	1706

ANACONDA®

WELDING RODS

Circle No. 10 on Reader Service Card.

GRIND-O-FLEX does it



Unretouched Photo

Here's a 3-inch diameter Grind-O-Flex wheel smoothing and blending draw marks and welds on a tubular frame. Note how it shapes itself to a contour.

Grind-O-Flex comes in big diameters too — in fine or coarse grits — to blend welds, smooth casting flash, polish rough surfaces. Wheels form themselves to fit the job. No danger of "digging" into stock. There is a grit made to fit your job, polish or grind.

Beautiful-finish-wise, cost-wise and time-saving-wise, nothing can touch GRIND-O-FLEX.

Our Engineering Staff can recommend the wheel for your job, and a supply source near you. Write us.

MERIT PRODUCTS, INC.
4023 Irving Place
Culver City, California

Circle No. 60 on Reader Service Card.

LETTERS TO THE EDITOR

Stainless Weld Magnetism

Gentlemen:

We manufacture chemical processing equipment, mainly in the stainless steels.

I would like to know if there is a firm that makes an instrument which can measure magnetism in stainless steel welds.

Marcy Burns
Star Liquid Machinery Corp.

The firms we know of that manufacture instruments of this type are the Ferro Corporation, Cleveland, Ohio, a regular advertiser in INDUSTRY & WELDING and Severn Engineering Co., Inc., Annapolis, Maryland.

We're at Your Service, Too

Gentlemen:

Thanks very much for your recent letter and the information contained therein.

It was very nice visiting at your office recently and we are impressed with the services which you have available that could be of help to us.

Please rest assured we shall take advantage of them when the opportunities arise.

R. K. Chapin, General Manager
Stulz-Sickles Company

Ceramic Back-Up Rings

Gentlemen:

I recently read your article on ceramic back-up rings.

I would like to have complete information on these rings such as, are they commercially available and from whom and in what sizes

Man, this ZIP electrode's the greatest!

He's right. The new Westinghouse ZIP-14 universal electrode handles easily in all positions, has very low spatter loss, deep penetration, fast burnoff, feather-touch slag removal and a quiet, smooth arc. This powdered-iron electrode fits both E-6014 and E-7014 classifications. There's no burning through, no undercutting even on vertical down work.

What more can you ask for in an electrode?

We know you'll like it. Try it in your own shop—under your conditions! It will sell itself! J-21984

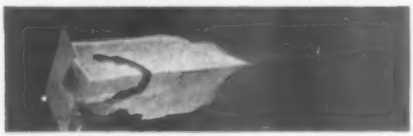
Only Westinghouse offers this welding leadership!

YOU CAN BE SURE... IF IT'S Westinghouse

Circle No. 96 on Reader Service Card.

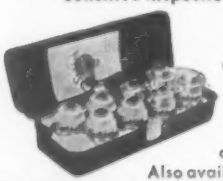
SPOT CRACKS with SPRAY ON Spotcheck®

DYE PENETRANT INSPECTION



Non-visible crack as detected on carbide tool.

- ✓ *CONVENIENT—EASY TO USE* **Spotcheck—in pressurized spray cans.**
- ✓ *DOES THE JOB EASIER* **Detects cracks in tools, parts, machinery.**
- ✓ *ENDS GUESSWORK ARGUMENTS* **Positively spots cracks, not scratches.**
- ✓ *NO OTHER EQUIPMENT NEEDED* **No pumps, hoses, brushes, compressors.**
- ✓ *PORTABLE—USE ANYWHERE* **Sensitive inspection in the field or plant.**



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Company _____
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LETTERS TO THE EDITOR . . .

(Continued from Page 14)

and shapes. How are they removed? In what manner are they held in place while making up the joint? Do they have mechanical strength to aid in joint alignment? What about the effect of pre-heating to 500°F-700°F? Is it recommended that they be removed prior to stress relieving? Do they affect radiography?

J. A. Pratt, Metallurgical Engineering
Westinghouse Electric Corp.

Resistance Welding ABC's

Gentlemen:

I noticed in your Letters to the Editor column a letter concerning the availability of reprints on the ABC Series on Resistance Welding.

Being a new recipient of your magazine I missed the series completely, and as the bulk of our welding is of the resistance variety I would very much appreciate a set of reprints.

Incidentally, I enjoy the magazine very much.

Jules Meylan, Welding Engineer
Easy Washing Machine Div. of The Murray Corp. of America

Pipe Lay-out

Gentlemen:

Could you tell us where to find a practical means for laying out the cut-out to weld a smaller pipe to a larger one at a 90 degree angle. The problem is that the combination can be any one of the possible combinations with pipe up to 12" diameter.

H. R. Cocklin, Secretary
Laco Oil Burner Company

All requests for information and copies of articles contained in the above 'letters' were handled promptly.

MAINTENANCE MEN! Solder • Heat • Braze

with the Prest-O-Lite Trade-Mark 5-in-1 OUTFIT

Outfit includes six-ft. length of fitted hose and fully adjustable gas pressure regulator for exact flame control.

This compact outfit easily handles all of the soldering, heating, and light brazing necessary in the maintenance and repair work in most buildings, plants, and factories. One handy kit with a flame for every job. Its four differently sized, open-flame stems and soldering iron are instantly interchangeable on one handle for any job from heavy heating to fine electrical soldering. Entire outfit is packed in a sturdy, steel carrying case and operates from small, portable tanks of acetylene. The torch handle has a shutoff valve and built-in pilot flame control for convenience and gas economy. Ask your LINDE jobber for a demonstration. Or write LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 E. 42nd St., New York 17, N. Y. In Canada: Linde Air Products Company, Division of Union Carbide Canada Limited, Toronto.

GET IT FROM YOUR LINDE JOBBER

The terms "Linde" and "Prest-O-Lite" are registered trade-marks of Union Carbide and Carbon Corporation.

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P&H Welding Positioners give you

GREATER CAPACITY and GREATER VALUE for every dollar you invest

3000-LB. MODELS/LOAD-CAPACITY COMPARISON CHART

Capacity Shown Below at 12" off center of Rotation and Distances of Center of Gravity of Load from Table.

Distance Positioner	12"	18"	24"	30"	36"	42"	48"	54"	60"
P&H	**3000**	**2510**	**2160**	**1900**	**1690**	**1520**	**1390**	**1270**	**1180**
A	3000	2000	1500	1200	1000	–	–	–	–
B	3000	2250	1800	1500	–	–	–	–	–
C	2987	2187	1725	1424	1212	1056	935	839	760

This chart shows how a typical 3000 lb. P&H welding positioner handles loads far beyond the positions where competitive makes quit! P&H positioners handle big, bulky or odd-shaped weldments with ease because of these

More table tilt — 135 degrees

More clearance for rotation — no legs or posts interfere

Circle No. 102 on Reader Service Card.

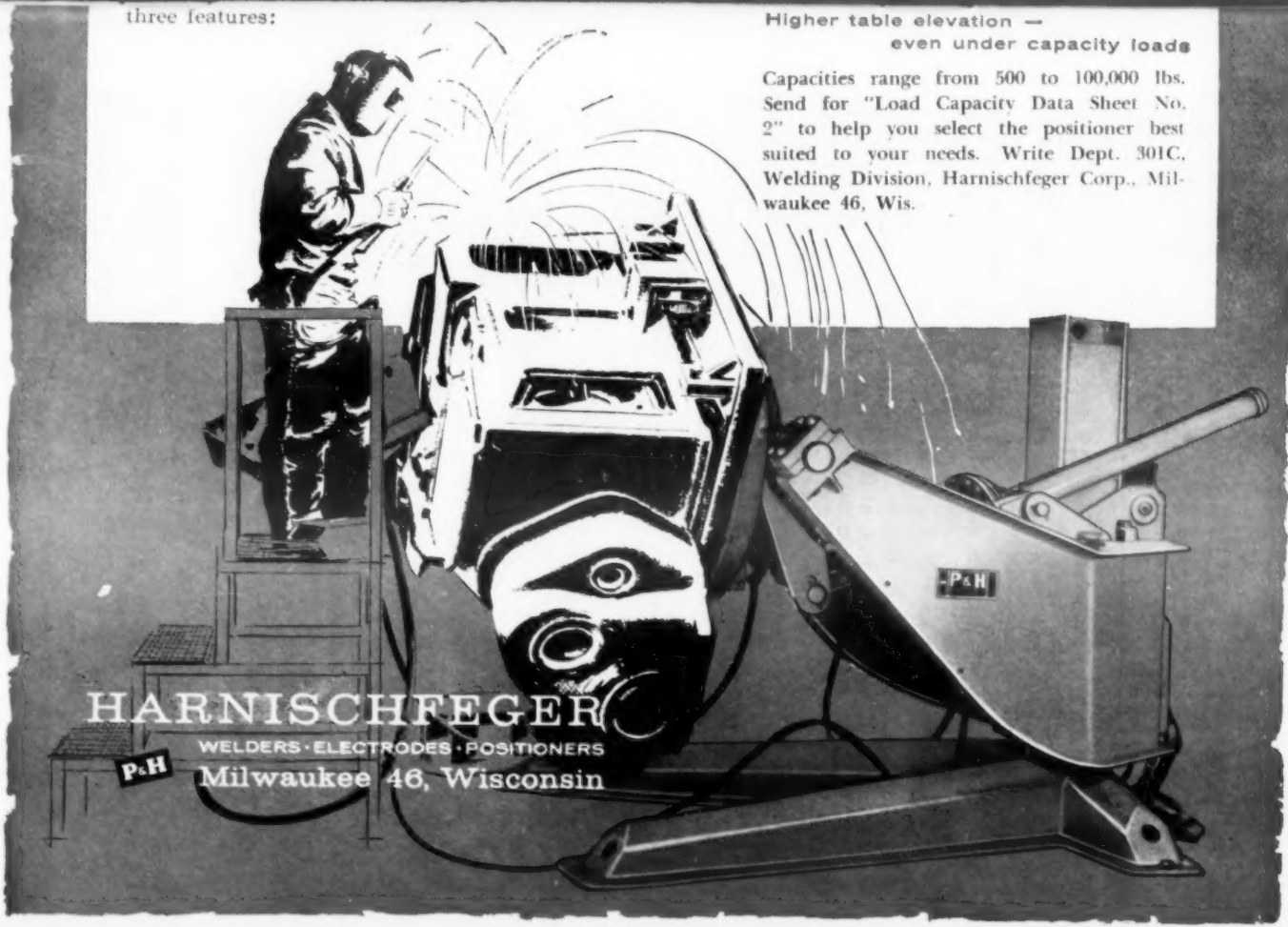
ky or odd-shaped weldments with ease because of these

no legs or posts interfere

three features:

Higher table elevation — even under capacity loads

Capacities range from 500 to 100,000 lbs. Send for "Load Capacity Data Sheet No. 2" to help you select the positioner best suited to your needs. Write Dept. 301C, Welding Division, Harnischfeger Corp., Milwaukee 46, Wis.



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Literature Featured In Ads This Month

TO GET ANY OF THE REFERENCE DATA DESCRIBED HERE, CIRCLE THE APPROPRIATE NUMBER ON THE READER SERVICE CARDS IN THIS ISSUE

49 **"One for all" headgear assembly** with choice of four eye and face shields is described. JACKSON PRODUCTS. Inside Front Cover.

28 **Pipe welding layouts made easy** is the subject of brochure. CONTOUR MARKER CORP. Page 2.

100 **"Bronze Welding — Modern Tool of Industry"** is title of helpful book offered. BRIDGEPORT BRASS CO. Page 10.

96 **Powdered iron electrode** which fits both E-6014 and E-7014 classifications is featured. WESTINGHOUSE ELECTRIC CO. Page 15.

59 **How to spot cracks** with spray-on dye penetrant inspection is explained. MAGNAFLUX CORP. Page 16.

102 **Load capacity data sheet** helps select positioner best suited to your needs. HARNISCHFEGER CORP. Pages 18-19.

91 **How to cut two perfect notches** in pipe or tubing with one press downstroke is explained. VOGEL TOOL & DIE CORP. Page 28.

87 **Complete line of arc welding accessories** and aluminum arc welding cable are featured in catalog. TWECO PRODUCTS CO. Page 31.

13 **"A Guide to Selective Fluxing . . "** is the title of a booklet which explains low temperature silver brazing. AMERICAN PLATINUM WORKS. Page 35.

31 **Complete line of goggles** is featured in safety catalog. DOCKSON CORPORATION. Page 39.

51 **New single stage regulator** is featured in descriptive literature. K-G EQUIPMENT CO., INC. Page 40.

12 **Gloves for welding operators** and their many exclusive design features are described. AMERICAN OPTICAL CO. Page 41.

89 **Remote control of current and arc-type** for versatile DC welder is explained. VICKERS ELECTRIC DIVISION. Page 50.

41 **How positioned welding can cut overhead** and labor costs in half is explained. HARNISCHFEGER CORP. Pages 52-53.

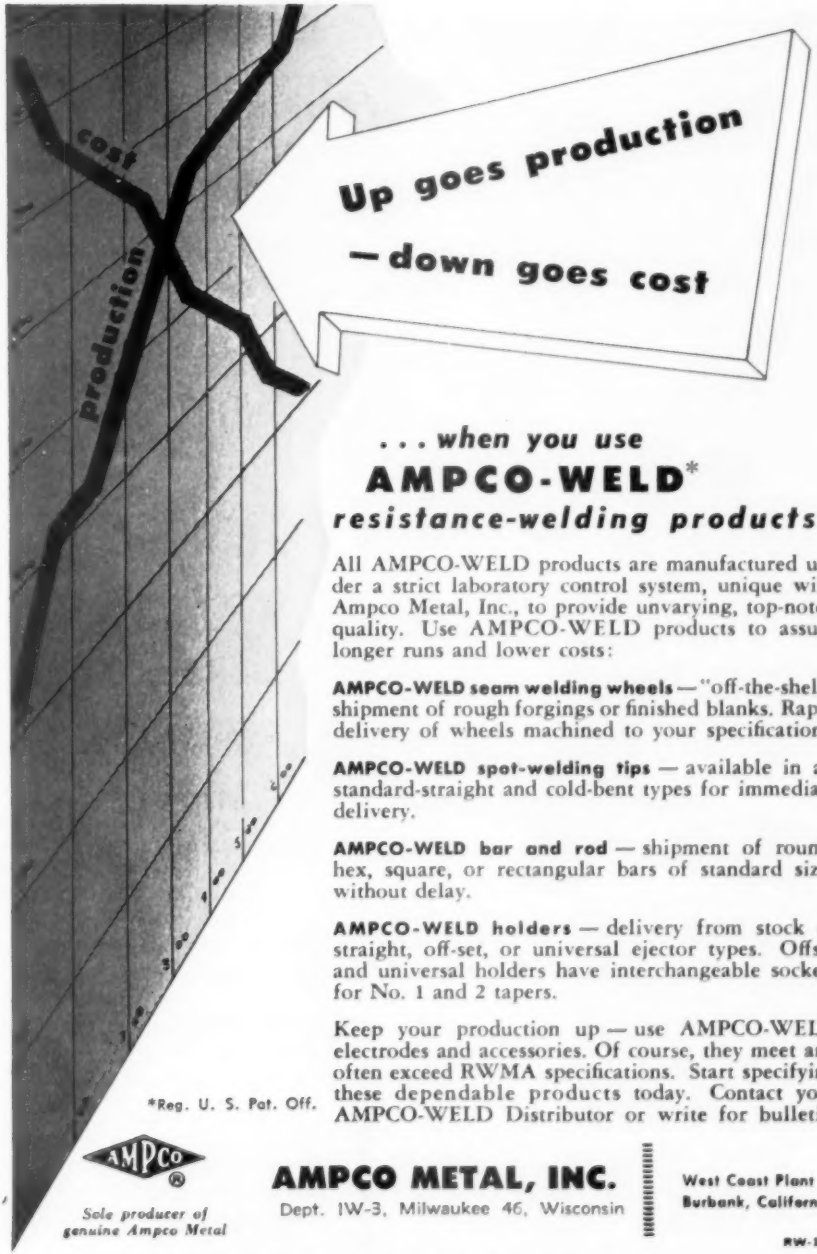
58 **Metal-Arc-Gas Shielded Welding** with CO_2 is subject of technical and operating data. LIQUID CARBONIC CORP. Page 57.

15 **Never rebuilt but always new** is the way in which welding ignitrons are described in data sheets. AMPEREX ELECTRONIC CORP. Page 67.

71 **Lifting and positioning clamps** and valuable application data on their use is contained in 14-page illustrated catalog. J. C. RENFROE & SONS, INC. Page 68.

98 **How preformed silver brazing alloys** can increase production and cut costs is explained in Bulletin HH-5. WHITEHEAD METAL PRODUCTS CO. Page 79.

9 **Fabrication of aluminum by welding,** brazing or soldering is explained in free, informative book. ALUMINUM COMPANY OF AMERICA. Pages 72-73.



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AMPCO-WELD*

resistance-welding products

All AMPCO-WELD products are manufactured under a strict laboratory control system, unique with Ampco Metal, Inc., to provide unvarying, top-notch quality. Use AMPCO-WELD products to assure longer runs and lower costs:

AMPCO-WELD seam welding wheels — "off-the-shelf" shipment of rough forgings or finished blanks. Rapid delivery of wheels machined to your specifications.

AMPCO-WELD spot-welding tips — available in all standard-straight and cold-bent types for immediate delivery.

AMPCO-WELD bar and rod — shipment of round, hex, square, or rectangular bars of standard sizes without delay.

AMPCO-WELD holders — delivery from stock of straight, off-set, or universal ejector types. Offset and universal holders have interchangeable sockets for No. 1 and 2 tapers.

Keep your production up — use AMPCO-WELD electrodes and accessories. Of course, they meet and often exceed RWMA specifications. Start specifying these dependable products today. Contact your AMPCO-WELD Distributor or write for bulletin.

*Reg. U. S. Pat. Off.

AMPCO®

Sole producer of genuine Ampco Metal

AMPCO METAL, INC.

Dept. IW-3, Milwaukee 46, Wisconsin

West Coast Plant
Burbank, California

RW-18A

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29 **Advantages of positioned welding** are featured in illustrated Bulletin WP26. CULLEN-FRIESTEDT CO. Page 84.

37 **How to measure iron content in a weld** with new precision instrument is explained. FERRO CORPORATION. Page 85.

48 **How flux recovery systems** save money is explained in illustrated folder. INVINCIBLE VACUUM CLEANER MFG. CO. Page 86.

81 **Rebuilding worn tractor grousers** is subject of brochure. STULZ-SICKLES CO. Page 98.

74 **Extra-large jumbo welding goggles** are subject of brochure. SELLSTROM MFG. CO., Page 103.

Vulcanized, permanent cable splices WITHOUT POWER LOSS!

IN 5 MINUTES

- Insulating sleeves are vulcanized to cable . . . can't pull away.
- Conductivity of splice is as good as the cable itself.
- Completed splice is tapered and smoothly rounded, so cable won't be caught on obstructions when dragged.
- Economical, because of low cost of components. You can afford to splice (salvage) short cable lengths.

New CAM-LOK portable Cable Splicing Kit produces vulcanized, neoprene insulated cable splices anywhere in just 5 minutes . . . makes them waterproof, shockproof.

Simply strip back insulation on cables . . . insert bare ends in copper tube supplied . . . crimp . . . place inner sleeve over crimp . . . vulcanize outer sleeve to cable jackets. No tools or experience needed . . . no production delays.

Write for Catalog and full details today, or see the complete CAM-LOK line in Booth #440, AWS Welding Show, April 9-11, Philadelphia.

CAM-LOK Division
Empire Products, Inc.
P. O. Box U-98, Cincinnati 36, Ohio

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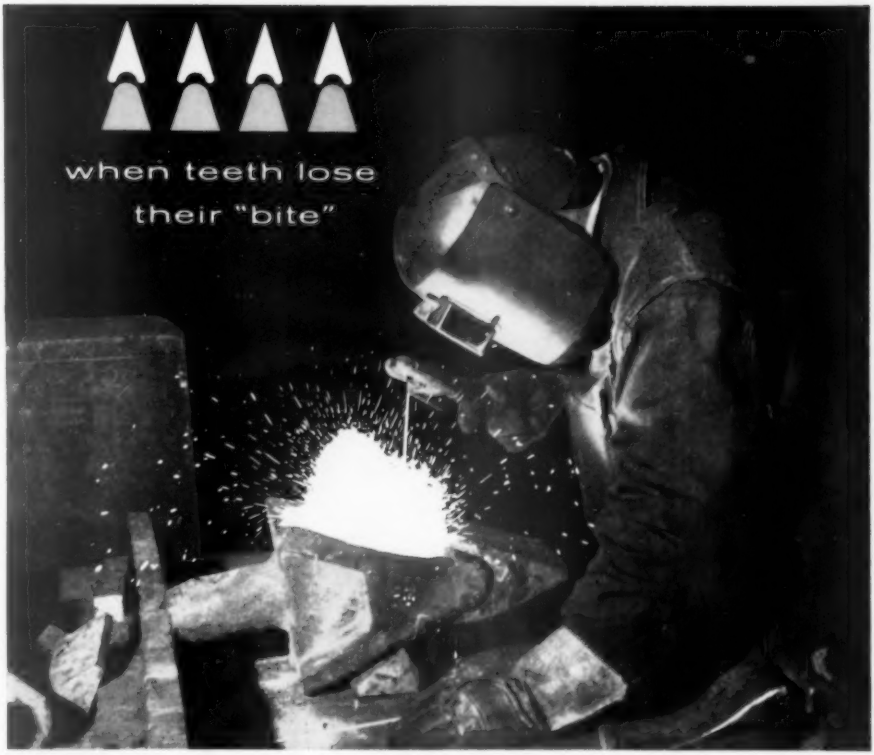


It's a **15-MINUTE REBUILDING JOB**
with Amsco® Cast-to-Shape Repointers

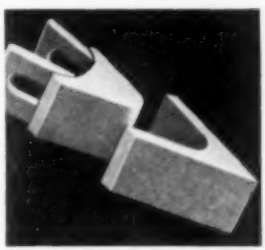
Easy to weld on . . . add strength and service life to entire tooth

Where dipper-tooth wear is moderate, and where digging conditions are not too severe, Amsco Cast-to-Shape Repointers provide a cost-saving answer to tooth replacement.

An average-size tooth can be completely rebuilt in about 15 minutes. The repointer overlaps the tooth top and bottom and is easily welded in place, using only a few electrodes.

Cast of Amsco Manganese Steel, with "ears" that protect the flat sides of the tooth, these repointers add strength and service life to the entire tooth. Available as individual repointer units, or in bar lengths.

For heavy digging, use Amsco "Wear-Sharp" Repointers or Repointer Bars. Order Amsco Repointers from your nearby Amsco Distributor.



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AMSCO

American Manganese Steel Division • Chicago Heights, Ill.

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Distributed in Canada by Canadian Liquid Air Co., Ltd.

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Tough! as they come

The modern Atlas plant is devoted exclusively to building the finest weld cleaning tools in America. There are models to suit the man and every type work. If you haven't tried Atlas you don't know what a difference "balance and feel" can make in production and quality of work. They can take it.

ATLAS WELDING ACCESSORIES INC.

707 E. LEWISTON AVENUE FERNDALE 20 (DETROIT) MICH

B-1 "Re-Bit" Dual Tool 10½" 16 oz.

B1-W "Re-Bit" Dual Tool 10½" 15 oz.

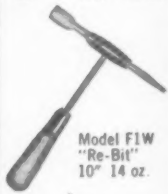
Model A Dual Tool 10½" 17 oz.

Model AW Dual Tool 10½" 16 oz.

Model E-1 "Re-Bit" 9" 12 oz.

Model E1-W "Re-Bit" 9" 10 oz.

Model F-1 "Re-Bit" 10" 16 oz.



Model F1W "Re-Bit" 10" 14 oz.

Model G Chisel & X-Chisel 9" 14 oz.

H-9" 14 oz. L-10" 17 oz. Cone & Chisel

Model I Chisel & X-Chisel 9" 13 oz.

J-9" 13 oz. N-10" 15 oz. Cone & Chisel

LCP-10" 17 oz. HCP-9" 14 oz. Cone & X-Chisel

Model K Cone & X-Chisel 10" 17 oz.

JCP-9" 13 oz. NCP-10" 15 oz. Cone & X-Chisel

Model M Chisel & X-Chisel 10" 15 oz.

Models WH: 10-20-30 12" 14 oz.

Model C "Re-Bit" Chisel & symbol

Model CW "Re-Bit" Chisel & symbol

Models OCC—OCP—ODC 9½" 10 oz.

ASK YOUR DEALER TO SHOW YOU THE ATLAS LINE

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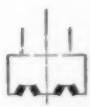
3 internal cone seating surfaces

instead of one external cone which is easily damaged . . .

internal conical seat surfaces do it . . .

external cone — easily damaged



internal cones — well protected

Internally opposing conical seat surfaces are protected against external damage and they permit complete reconditioning by swaging—a process which, on other type tips, might close up all ports. Conical surfaces on the inside—as against outside seating surfaces make all the difference—to tip life—and to your pocketbook.

And—the most modern tip drilling processes assure each and every gas passage absolute uniformity, freedom from distortion and accurate line-up. AFTER ALL, CUTTING TIPS DO COST MONEY—WHY NOT BUY TORCHES AND TIPS WHICH CAN SERVE LONGER.

you won't need to throw away so many cutting tips

NATIONAL welding equipment company... 218 fremont street san francisco 5 california

532 H

Circle No. 67 on Reader Service Card.

NEWS of the WELDING INDUSTRY

Appointments at Arcos

Royal D. Thomas has been appointed chairman of the Board of the Acros Corporation, Philadelphia. His appointment is announced along with that of three

ROYAL D. THOMAS

R. D. Thomas, Jr.

other top company officers, all of whom assumed their new posts on January 1, 1957.

Succeeding him as president is R. David Thomas, Jr., who was formerly executive vice president. James E. Norcross, former general sales manager, becomes executive vice president. Henry A. Molt, former works manager, assumes the new office of vice president in charge of manufacturing.

Magnaflux Expands

Magnaflux Corporation's main plant at 7300 W. Lawrence Ave., Chicago, has been enlarged by a just completed building addition. This new area increases the assembly area by a third,—10,000 additional feet, and will be devoted to additional production operations.

Eutectic Promotes L. D. Richardson

Leon D. Richardson has been appointed Assistant General Sales Manager of Eutectic Welding Alloys Corporation, according to an announcement by Rene D. Wasserman, president. Mr. Richardson had been Eutectic's Sales Manager

for the Eastern States and has been connected with the firm for the last 11 years.

He will work with Fred F. Roehll, Vice President and National Sales Manager, in directing the activities of Eutectic's more than 350 District Engineers and Field Supervisors.

Mr. Richardson has had more than 20 years industrial experience, most of it directly involving welding engineering and metallurgy.

(More News on Page 28)

the NEW miller MULTI ARC

The Miller Multi-Arc combination ac-dc welder, built specifically for metallic arc welding, delivers either ac or dc current at the flick of a switch. Electrical control circuit eliminates mechanical controls. Primary switch is standard equipment; Power Factor Correction optional. Six models from 10 to 525 amperes—all with 60% duty cycle ratings.

Complete specifications sent on request.

". . . If it's Miller you know it's the finest . . ."

miller Electric Manufacturing Company, Inc.

APPLETON, WISCONSIN

distributed in Canada by CANADIAN LIQUID AIR CO., LTD., Montreal

Please visit booth 422 during the AWS Spring Meeting

Circle No. 65 on Reader Service Card.

Welded Design Awards

Two new awards for outstanding accomplishments in welded designs have been announced by the American Welding Society. They have been established by A. F. Davis of the Lincoln Electric Company, and will be known as The A. F. Davis Silver Medal Awards.

One award will be given annually for the paper selected as the best in the field of structural design. A similar award will be made in the field of machine design.

To be eligible for the award the paper must be written by either one or two authors and be published in The Welding Journal in the twelve month period ending with the December issue. The initial award period will cover the 1957 calendar year.

NCG Expands Facilities

A program for construction of industrial gas production facilities or expansion of present facilities at six locations in Alabama, California, Illinois, Puerto Rico and Venezuela was announced recently by National Cylinder Gas Company. The expansion program will bring to 78 the number of plants at which NCG produces one or more kinds of industrial gas, including one in Canada, another in Puerto Rico, three in Colombia and five in Venezuela.

Haines said that a $3,000,000 addition to NCG's liquid oxygen plant in Chicago will increase that plant's output by 150 per cent.

(More News on Page 112)

the **ARC-TWIN** *Cuts Two Perfect Notches*

in *One* Downstroke of Press!

SAVING both time and cost, it gives you perfect T-joints — instantly ready for welding or brazing without deformation or finishing! Twin-acting punch shears clean, from inside out, leaving two matching notches (in perfect 180° alignment) with every downstroke of the punch press. Quickly interchangeable dies and punches accommodate pipe and tubing from ½" to 2⅛" O.D.; special units, up to 3" O.D.

Special Arc-Twins for double notching stainless steel or monel metal and units built to your specifications can also be furnished.

PATENTED

Ask for twin-notched sample of pipe or tubing

VOGEL TOOL AND DIE CORPORATION 1819 North 32nd Ave. Melrose Park, Illinois

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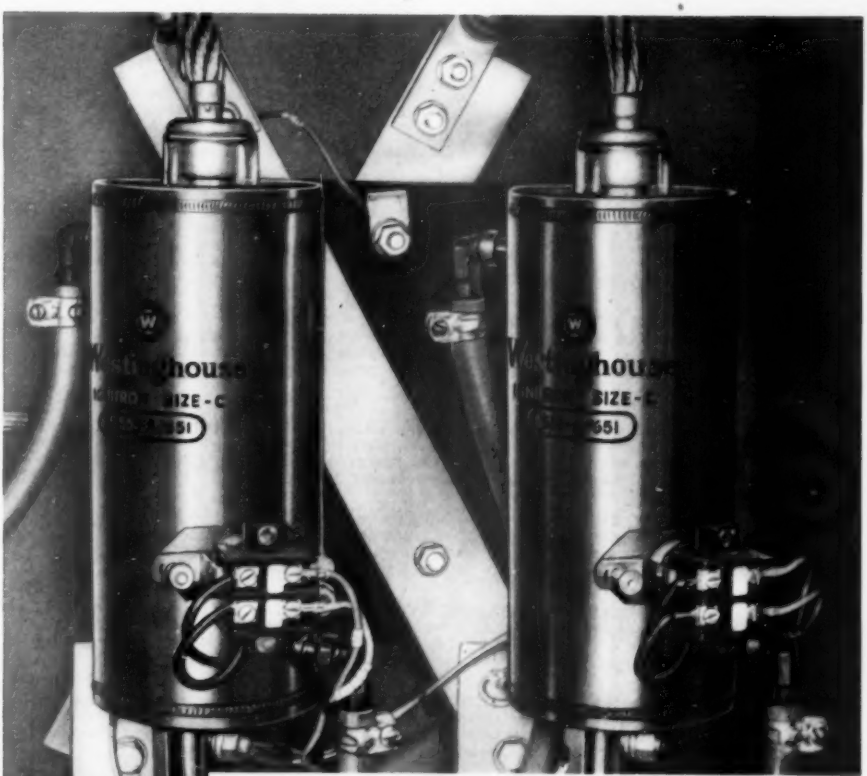
Westinghouse **IGNITRON TUBES** still the industry standard.



Westinghouse invented the Ignitron tube and has maintained a record of improvements that are today the accepted industry standards:

- kovar seals to permit use of steel envelopes • improved ignitors to assure accurate ignition.
- thermostatic control for overload protection and water savings.

For highest quality Industrial and Special Purpose tubes—always specify Westinghouse.

7ET-4103A

YOU CAN BE SURE...IF IT'S Westinghouse

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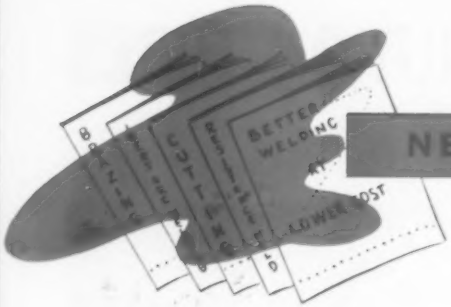


NEW REFERENCE DATA

The publications featured on these pages were written by experts. They are FREE to our readers. To obtain these helpful reference materials use postcard bound into this issue.

COMPLETE LINE OF RESISTANCE WELDING ELECTRODES AND ACCESSORIES made by Ampco Metal, Inc., is described and illustrated in a 28-page, two-color catalog now available. Bulletin RW-10 gives applications, specifications and dimensions of standard welding tips, wheels, dies and holders. **Circle No. 11 on Reader Service Card.**

HOW SPRAYWELDING EXTENDS SERVICE LIFE OF HYDRAULIC PUMP PLUNGER is the feature article of the January-February, 1957, edition of Colmonoy Alloy News. Published by Wall Colmonoy Corp., four-page news folder explains how hard facing hydraulic pump plungers of a billet extrusion press sharply reduced press maintenance costs. **Circle No. 111 on reader Service Card.**

SOLID CARBIDE END MILLS are the subject of 12-page catalog No. 601 issued by M. A. Ford Mfg. Company. Featured is two pages of end mill data, such as diameter, flute radius, shank diameter and overall length, for 11 different types of mills. **Circle No. 112 on Reader Service Card.**

WELDED MECHANICAL TUBING of carbon and stainless steel is featured in handy reference data published by Steel and Tubes Division of Republic Steel. New tolerance tables and additional size ranges for square, rectangular and round tubing is given in wall, desk and pocket-size booklets. **Circle No. 113 on Reader Service Card.**

A COMBINATION AC-DC ARC WELDER built specifically for metallic arc welding is featured in literature from Miller Electric Mfg. Co. Described and illustrated are six models ranging from 10 to 525 amps, all with 60 percent duty cycle ratings. **Circle No. 65 on Reader Service Card.**

INDUSTRIAL APRONS THAT ARE PRACTICALLY INDESTRUCTIBLE are featured in catalog sheet from Robin W. Adair Co., Inc. Described and illustrated are tough, lightweight aprons made of a new "neo-nylon" material which resists acids, alkalis, oil, grease and detergents. Aprons are available in three sizes. **Circle No. 114 on Reader Service Card.**

FULL LINE OF SURFACE GRINDING AND BENCH GRINDER WHEELS is featured in catalog from DoAll Company. Literature contains data explaining meaning of grinding wheel code numbers. Composition and applications of fundamental wheel-types are described. **Circle No. 115 on Reader Service Card.**

SUCCESS OF IRON POWDER ELECTRODES, their performance factors and AWS specifications are fully covered in a new folder issued by Hoeganaes Sponge Iron Corp. Form 106 contains technical data on welding performance of iron powder electrodes, and tells how this electrode-type was used in fabrication of a huge shield for the third tube of the Lincoln Tunnel. **Circle No. 116 on Reader Service Card.**

SHORTING OUT . . . IS FOREVER OUT is the catchy way in which a new spot welding insulation material is described by its manufacturer. Described and illustrated in handy data sheet is Amaza plastic insulation. **Circle No. 117 on Reader Service Card.**

(Turn to Page 33)

the weldor's favorite

redhead!

TWECO
GROUND CLAMP

Made in Four Sizes

TWECO, the original arc welding ground clamp, provides a quick, positive and portable connection to the work. The entire welding circuit, including the electrode holder, runs cooler with a Tweco ground clamp, which helps to eliminate arc blow, slides on and off the work easily, yet provides a firm bite on the work with ample contact area in either or both jaws. Order from your welding distributor now to enjoy this positive grounding which makes possible lower machine settings, reducing current consumption and power costs.

SEE YOUR LOCAL WELDING SUPPLY DISTRIBUTOR

Write for FREE Catalog picturing complete line of Arc Welding Accessories and TWECO-LITE Aluminum Arc Welding Cable.

Tweco

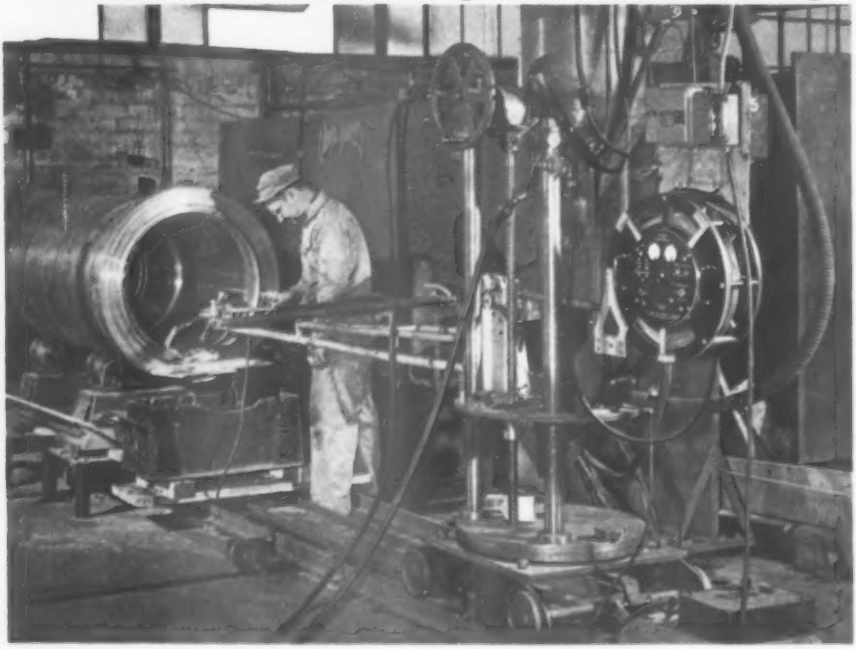
MANUFACTURERS: ARC WELDING ELECTRODE HOLDERS, GROUND CLAMPS, CABLE CONNECTORS, TWECO-LITE ALUMINUM WELDING CABLE

PRODUCTS, INC.

BOSTON AT MOSLEY • WICHITA, KANSAS, U.S.A.

Circle No. 87 on Reader Service Card.

How to *guarantee* yourself the positive benefits of submerged arc welding



Courtesy of Byron Jackson, Division Borg-Warner, Los Angeles, Calif.

WELD WITH ARCOS

STAINLESS WELDING RODS

To save time and money, submerged arc welding was used to overlay type 308 stainless weld metal on the inside of this barrel of a boiler pump. Arcos Chromar Coiled Wire helped guarantee these savings through fast, easy deposition with minimum dilution. On your own jobs, Chromar Coiled Wire . . . *quality controlled* . . . teamed with the time-saving advantages of submerged arc welding will keep your welding costs down and the quality of your welds high. ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.

Circle No. 18 on Reader Service Card.

NEW REFERENCE DATA

from page 30

WELDING CABLE CONNECTORS made by Cam-Lok Division, Empire Products, Inc., are featured in handy illustrated catalog sheet. Described and illustrated are solder-type and mechanical-type connectors, terminal connections, special adaptors and cable lugs. **Circle No. 137 on Reader Service Card.**

A POWDERED METAL COATING which increases amperage for rapid deposition of weld metal without heating is an important part of new 3½ percent nickel—13 percent manganese electrode introduced by Industrial Overlay Metals, Inc. Powdered metal which is consumed in arc is said to give Bergstrom Coated 312 electrodes all the speed advantages of a bare manganese rod without its disadvantages **Circle No. 118 on Reader Service Card.**

HOW TO CHOOSE AND USE RIGHT DISC-WHEEL FOR EACH WELD GRINDING JOB is the subject of a new catalog offered by Bay State Abrasive Products Co. Featured is company's complete line of four wheel-types. **Circle No. 119.**

COMPLETE LINE OF PORTABLE AIR TOOLS made by Buckeye Tools Corp. is featured in interesting pocket catalog No. 2. Included is condensed information on angle grinders and sanders, impact wrenches and nibblers. Design and construction features are explained. **Circle No. 120 on Reader Service Card.**

"REPAIR CAST IRON PARTS QUICKLY AND EASILY" is the lengthy title of a not-so-lengthy handy and informative booklet offered by International Nickel Co., Inc. Featured are case histories in which company's Ni-Rod and Ni-Rod "55" electrodes were used. **Circle No. 47 on Reader Service Card.**

NEW DEVELOPMENTS IN SAFETY GLOVES AND CLOTHING are featured in a circular issued by Olympic Glove Co., Inc. Featured and described in detail is company's All-Cool foil-interlined welding gloves. Foil-interlined palm protection is also explained. **Circle No. 122 on Reader Service Card.**

COMBINATION OXY-ACETYLENE WELDING AND CUTTING UNITS are the subject of a catalog from Victor Equipment Co. Featured is company's complete line with a wide variety of nozzles, tips and cutting attachments and field-proved regulator design. **Circle No. 90 on Reader Service Card.**

A COMPLETE ARC WELDING ACCESSORY AND SUPPLY CATALOG is being distributed by Hobart Bros. Company. New 16-page Catalog EW-196 covers electrode holders, ground clamps and cable connectors, head and eye and face protective equipment and safety clothing, among others. **Circle No. 123 on Reader Service Card.**

YOU CAN AFFORD A PORTABLE X-RAY UNIT according to Balteau Electric Corp. Literature from the company describes and illustrates Baltospot X-ray unit which is light enough to carry from job to job yet inexpensive enough for even the smaller shops. **Circle No. 20 on Reader Service Card.**

FULL APPLICATION DATA ON BUILDING WORN BUCKET TEETH IS contained in Guidebook offered by Stoody Company. Featured is complete line of alloys for hardfacing and surfacing of wearing equipment. **Circle No. 101 on Reader Service Card.**

IRON POWDER LOW HYDROGEN BUILD-UP ELECTRODES just introduced by Alloy Rods Company are the subject of complete data sheet. Properties and applications are given for three different electrode types on sheets which are punched for easy insertion in shop notebooks. **Circle No. 7 on Service Card.**

(Turn to Page 34)

YOU WON'T NEED TO THROW AWAY SO MANY CUTTING TIPS is the message from National Welding Equipment Company. Literature offered explains new internal conical seat surfaces which are protected against external damage and permit complete reconditioning by swaging. **Circle No. 67 on Service Card.**

THE LAST WORD IN AIR TOOL CATALOG has been published by Thor Power Tool Co. A new 84-page illustrated catalog just issued contains complete descriptions and specification of all Thor industrial air tools. Some 40 basic tools, with thousands of model variations, accessories and adaptors, are described. This is the second edition of the company's No. 53 catalog. **Circle No. 125 on Reader Service Card.**

PROTECTION WITH COMFORT is the way Dockson Corporation describes its complete line of welding and cutting goggles. Complete catalog from the company pictures and describes each individual goggle set. **Circle No 31 on Reader Service Card.**

A NON-CORROSIVE SOLDERING AND TINNING FLUX for all soldering operations, including those on stainless steel, Monel and chrome, is the subject of a handy pocket-size brochure issued by J. W. Harris Co. Folder explains how flux gives clean and perfect adhesion between metal and solder. **Circle No. 126 on Reader Service Card.**

A NEW GROUP OF D-C RECTIFIER WELDERS made by A. O. Smith Corp. are featured in Bulletin MW-182. Described and illustrated are 200, 300 and 400-amp welders and company's complete line of nine standard A-C welders and eight standard D-C welders. **Circle No. 78 on Reader Service Card.**

HARDNESS TESTING EQUIPMENT is the subject of Bulletin DH-328 issued by Wilson Mechanical Instrument Division, American Chain & Cable Co. Three models of Tukon Testers for micro and macro hardness testing are described and illustrated in 12-page bulletin. **Circle No. 127 on Reader Service Card.**

CONVERTING OLD ALUMINUM-TYPE DESIGNATIONS TO NEW ONES NOW IN USE is made easy with a handy conversion chart available from All-State Welding Alloys Co., Inc. Also given are six other charts designed to aid in selection of alloys and fluxes used in welding, soldering and brazing aluminum. **Circle No. 128 on Reader Service Card.**

PRECISION FUSION WELDING EQUIPMENT made by Welduction Corporation is featured in colorful, 6-page catalog. Described and illustrated are radial welders, automatic controls, positioners and special equipment to meet all welding needs. **Circle No. 129 on Service Card.**

A VARIETY OF FLUXES FOR SOLDERING are featured in technical bulletin available from Accurate Specialties Co., Inc. Complete description, application data and advantages are given for a mild acid flux, non-activated rosin flux and an activated rosin flux. **Circle No. 130 on Reader Service Card.**

MOVING MATERIALS UP STAIRS is made easy with a new stair cart introduced by Valley Craft Products, Inc. A colorful 4-page brochure from the company explains how this new truck "rolls up" and "floats down" steps and ramps. **Circle No. 131 on Reader Service Card.**

AN ARC WELDING MACHINE CATALOG issued by Air Reduction Sales Co. features the company's complete line of welders. Described and illustrated are selenium rectifier and DC motor generator units, AC and DC engine-driven arc welders and AC transformer welders. Specifications for each machine, from ampere ratings to outside dimensions, are included. **Circle No. 132 on Reader Service Card.**

(Turn to Page 37)

Circle No. 13 on Reader Service Card. →

SEND FOR YOUR FREE COPY...

With the recently developed DEOXO and BLACK FLUX added to the line of APW Fluxes, you can at last *key the selection of flux to the precise requirements* of the job in production.

Do this to get easier, more rapid, *consistent production*, greater economy and fewer rejects. Our fluxing manual "A Complete Guide To Selective Fluxing For Low Temperature Silver Brazing" provides all the data you'll need to know why and how to make the correct selection of flux.

Write for your copy, *today!* We'll be glad to rush it to you by return mail —no charge, of course. ★ ★

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Looking Ahead?

. . . to the big 5th A.W.S. Welding Show?

Philadelphia, Pa., Convention Hall
April 9-10-11, 1957

We'll be there in Booth 113

And we'll have some interesting new equipment and demonstrations to show you
Stop in and see us! (Booth 113)

SMITH WELDING EQUIPMENT CORP.
DEPT. IW-201 • 2633 S.E. 4th Street • Minneapolis, Minn.

Circle No. 79 on Reader Service Card.

WELDMENT HOLDING CLAMPS AND ACCESSORIES are featured in a handy folder from Acorn Iron & Supply Co. Described and illustrated are four tools—a gooseneck hold-down dog, tapered drift pin, arm clamp and special hold-down bolt and nut—designed for use with the company's bending blocks or welding platens. **Circle No. 133 on Reader Service Card.**

AUTOMATIC WELDERS AND POSITIONERS made by Sight Feed Generator Co. are the subject of a handy four-page, two-color brochure. Illustrations and copy describe how Rexarc standard equipment can be adapted for any automatic welding job and can be used either as a portable unit or as a stationary installation. **Circle No. 134 on Reader Service Card.**

SIMPLIFIED WELDING PROCEDURES FOR EVERY BASE METAL are given in a 140-page Pocket Data Book available from Eutectic Welding Alloys Corp. Book TIS 2575 covers 120 welding rods, electrodes and compounds and gives instructions for their use. **Circle No. 161 on Reader Service Card.**

A NEW CABLE CONNECTOR introduced by Jackson Products is featured in a handy catalog sheet. Punched for easy insertion in shop notebook, sheet describes features of new connectors, including new Neoprene rubber insulators with tapered ends to stretch over welding cable snugly. **Circle No. 136 on Reader Service Card.**

BACKWARD CURVED BLADE CENTRIFUGAL FANS for commercial and industrial ventilating, heating and air conditioning are the subject of a 60-page, illustrated brochure issued by Chicago Blower Corp. Booklet features performance charts on the new fans. **Circle No. 160 on Reader Service Card.**

SOLDERING ALUMINUM WELDING CABLE TO SOLDER LUGS AND ARC WELDING ACCESSORIES will be a snap if you follow instructions given by Tweco Products Co. in an illustrated catalog sheet. Company explains in detail how to use Alcoa aluminum soldering and mechanical joint materials made available for use with Twecolite aluminum welding cable. **Circle No. 138 on Reader Service Card.**

ELECTRODE DATA BOOK packed with arc welding information in easy-to-use form has been prepared by National Cylinder Gas Company. Included in the 24-page book (NH-504) is: information on AWS-ASTM arc welding electrode specifications; how to estimate electrode consumption; summary of welding symbols; factors in selecting electrodes and other valuable data. **Circle No. 159 on Reader Service Card.**

HIGH TEMPERATURE ALLOYS for joining metal assemblies subject to extreme conditions of heat and corrosion have been introduced by Handy & Harman. Complete application data and properties are given for alloys which can be used in high-strength bonding of stainless steel, steel, inconel and copper. **Circle No. 162 on Reader Service Card.**

EVER SEE A ROUND WHEEL FIT INTO A SQUARE CORNER? That's the way Merit Products, Inc. describes their Grind-O-Flex wheel in illustrated literature now available. Large and small diameter wheels in any grit, form themselves to blend welds, smooth casting flash and polish rough surfaces **Circle No. 60 on Reader Service Card.**

DO-IT-YOURSELF CABLE CONNECTOR KIT and how it makes waterproof, crushproof insulated cable connections in a simple, seven-minute operation is described in literature from Cam-Lok Division, Empire Products, Inc. Featured is company's molded neoprene cable connector kit. **Circle No. 23 on Reader Service Card.**

LIFTING AND POSITIONING CLAMPS with safety snap lock to clamp on plate or assembly or snap open for easy removal is described in illustrated 14-page catalog issued by J. C. Renfroe & Sons, Inc. Catalog features specifications and applications for the clamps whose gripping power increases as load becomes greater. **Circle No. 71 on Reader Service Card.**

(Turn to Page 38)

NEW REFERENCE DATA

from page 37

A HIGH FREQUENCY HEATING UNIT for metal joining and production heat treating is featured in a two-color, 4-page illustrated brochure from Lepel High Frequency Laboratories, Inc. Described in detail is small and compact portable bench model T-2½-1. **Circle No. 163 on Reader Service Card.**

TORCHES AND EQUIPMENT FOR FLAME CUTTING, WELDING AND BRAZING are featured in complete Catalog No. 756 issued by Smith Welding Equipment Corp. Operating instructions and mechanical specifications are given for torches, tips and regulators. **Circle No. 164 on Reader Service Card.**

SOLID CARBIDE END MILLS manufactured by Severance Tool Industries, Inc., are the subject of a pocket-size folder. Dimensions are given for a complete line of mills. Special features, including company's regrinding service, are explained. **Circle No. 135 on Reader Service Card.**

PROTECTION FOR WELDING OPERATOR is the theme of a handy pocket-sized folder issued by Safety Clothing and Equipment Co. Described and illustrated are protective clothing, including golves, aprons, jackets and sleeves, and fire-resistant welding curtains. **Circle No. 165 on Reader Service Card.**

A CONTROLLED ARC POWER SUPPLY for semi-automatic and full automatic welding and how it assures consistently uniform results is the subject of literature from Metal & Thermit Corp. Explained is how M&T power sources insure uniform production, overall economy and dependable operation. **Circle No. 61 on Reader Service Card.**

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ACETYLENE CYLINDERS "TOPS"
Top Quality Cylinder Shells — Meet all ICC Requirements
Purity of Filler Materials — Saves Life of Acetone
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PROTECTION *with* COMFORT

DOCKSON'S complete line of goggles offers the finest, scientifically designed protection at minimum cost. Their many outstanding features and unusual comfort have earned them top preference in industry.

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Circle No. 31 on Reader Service Card.

You can save money...

with the K-G SINGLE STAGE REGULATOR

It costs less, right from the start, and as long as you use it.

It stays "on stream", delivers the pressures and volumes you want . . . requires virtually no internal maintenance.

Pressure check protected Nylon seat, Stainless Steel filter and working parts, hi-strength forged Aluminum body, damage-proof adjusting mechanism . . . put the K-G Series 1200 Regulator years ahead in *service, economy* and *performance.*

Try it and you'll be convinced . . . order from your K-G distributor, or write to K-G.

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Circle No. 51 on Reader Service Card.

Protection to do the Job...
Comfort to do it Better!

AO "DREDNAUT" WELDERS' GLOVES

American Optical "Drednaut" Gloves offer welders extras in protection and comfort. Made of specially chrome tanned cowhide, they provide maximum flexibility, heat resistance and long wear. *Only graded sidesplits are used* — selected for quality and uniform thickness.

Gunn Patterns have wing thumbs, follow natural shape of the hands . . . reduce hand fatigue — permit more comfortable gripping. Seam at base of palm double stitched and flat for comfort. Backs of Gunn Patterns are one piece with heavy lining. Six types of Drednauts (one illustrated) satisfy every preference: two Clute Patterns with double backs; three Gunn Patterns with full one-piece backs; one Montpelier Pattern with one-piece back, one-piece palm, all-welted seams.

SC5X163 — Very heat resistant — protects on heaviest gas and heaviest amperage electric welding. One-piece back and palm. Welted at all vulnerable seams for extra protection. Heavy lining on back. Overall length 14".

•

American Optical sweatbands increase worker comfort and production, decrease accidents. Check your needs.

Always insist on AO trademarked safety products. Your nearest American Optical Safety Products Representative can supply you.

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Circle No. 12 on Reader Service Card.

Welding Progress

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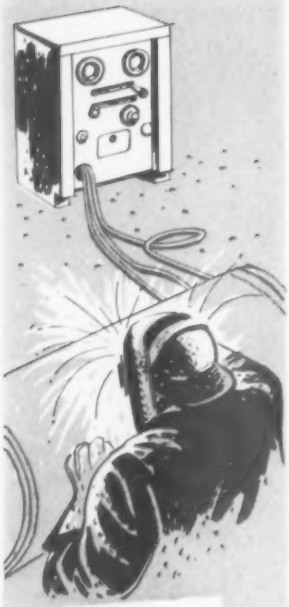


WELDING SUPPLIES • RADIOGRAPHIC EQUIPMENT
PLATING MATERIALS • ORGANIC COATINGS
CERAMIC MATERIALS • TIN & TIN CHEMICALS
METALS & ALLOYS • HEAVY MELTING SCRAP

NEW CONTROLLED ARC POWER SUPPLY IMPROVES WELDING

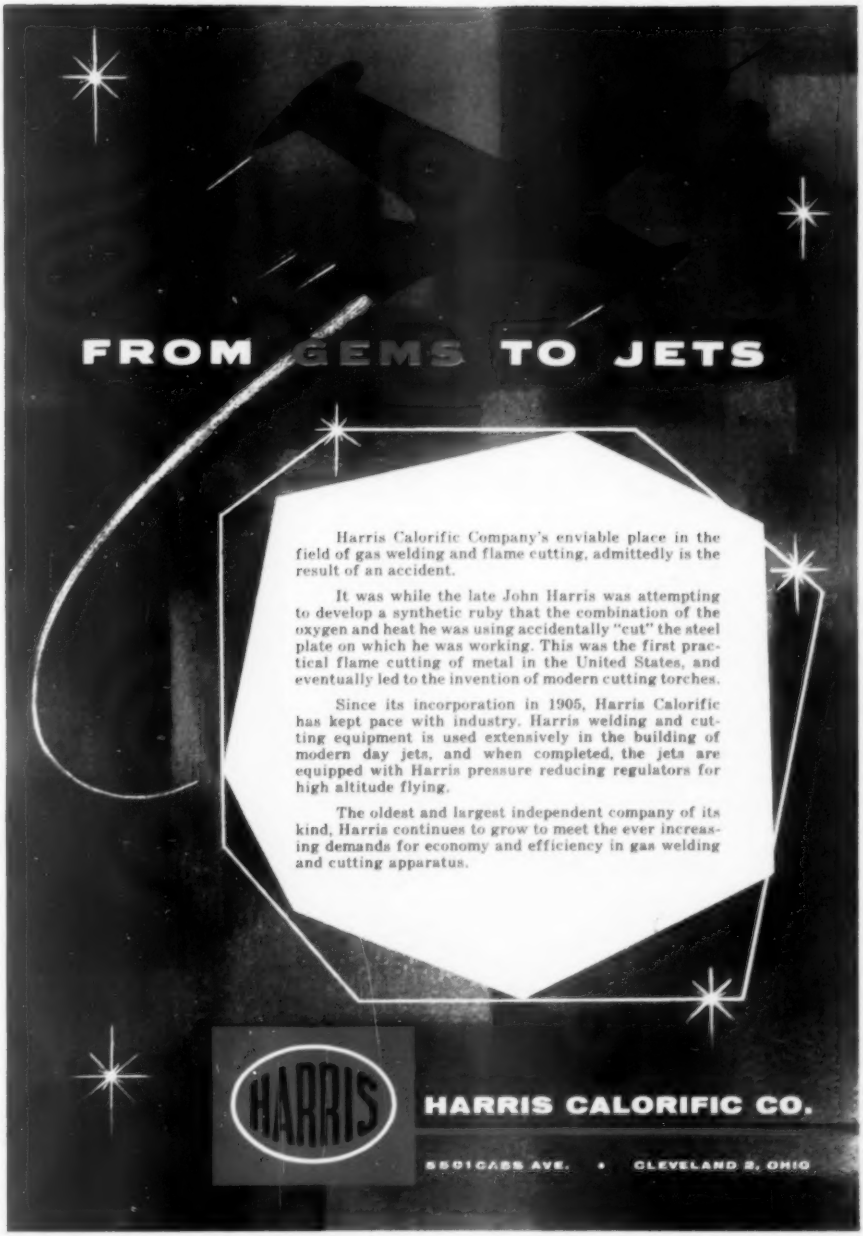
Teamed with constant speed wire feed, C.A.P.S. unit offers many advantages for semi and automatic welding.

A new constant voltage power supply recently introduced by the Metal & Thermit Corporation eliminates variables thereby lowering costs and improving weld quality. This rectifier-type machine delivers DC welding current at constant preset voltages. When teamed with a constant speed wire feed, it automatically controls the arc, maintaining a constant arc length. A built-in Arc Characteristic Controller provides a "cushion" effect, particularly desirable in low current density welding, and permits a greater range of current density with a given electrode. The result is lower costs, higher quality weldments.

C.A.P.S. welders have an efficiency of 85% or better and a power factor of 90% or higher at all settings. The equipment is rated at 100% duty cycle. Lighter and easily installed input wiring and switching are possible since less input current is required than in conventional power sources. Installation and power costs are both appreciably lower.

Literature on the M&T Controlled ARC Power Supply may be obtained by writing Metal & Thermit Corporation, Rahway, N. J.

Circle No. 61 on Reader Service Card.


FROM GEMS TO JETS
Harris Calorific Company's enviable place in the field of gas welding and flame cutting, admittedly is the result of an accident.
It was while the late John Harris was attempting to develop a synthetic ruby that the combination of the oxygen and heat he was using accidentally "cut" the steel plate on which he was working. This was the first practical flame cutting of metal in the United States, and eventually led to the invention of modern cutting torches.
Since its incorporation in 1905, Harris Calorific has kept pace with industry. Harris welding and cutting equipment is used extensively in the building of modern day jets, and when completed, the jets are equipped with Harris pressure reducing regulators for high altitude flying.
The oldest and largest independent company of its kind, Harris continues to grow to meet the ever increasing demands for economy and efficiency in gas welding and cutting apparatus.
HARRIS
HARRIS CALORIFIC CO.
5501 CASS AVE. • CLEVELAND 2, OHIO

Circle No. 42 on Reader Service Card.

New Arc Welding Process Speeds Fabrication of Carbon Steels

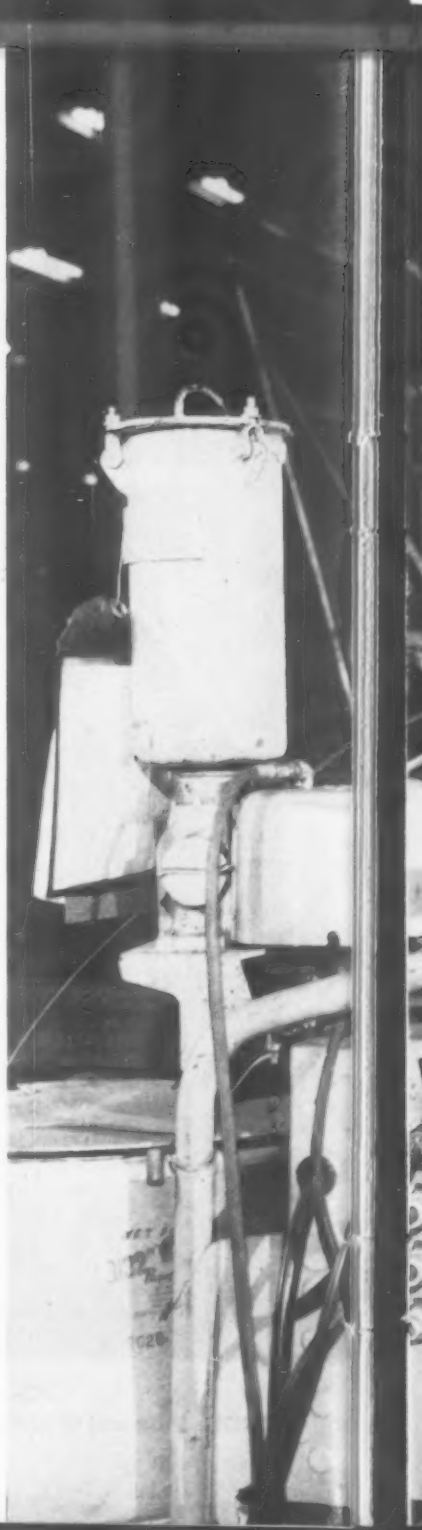
A new manual, semi-automatic welding process, which can be used to produce high quality welds in carbon steel has been introduced by Linde Air Products Co. Called "Unionarc", the process employs a continuously-fed wire electrode which is magnetically coated with flux and shielded in a CO_2 gas atmosphere. According to the company, the process, invented by Harry E. Kennedy, one of the men who also developed submerged arc Unionmelt welding, can be used in all positions at high speed. Assisting Mr. Kennedy in this new development were, Dr. Ed McCandless, John Galbraith, Dr. Gerry Claussen and several Linde Laboratory technicians.

Unionarc welding with 3/32-inch wire, according to Norman Davis, who is in charge of the introduction of the new process, deposits weld metal at a rate that is 50 to 100 percent greater than that obtained with conventional electrodes on most common downhand welding applications.

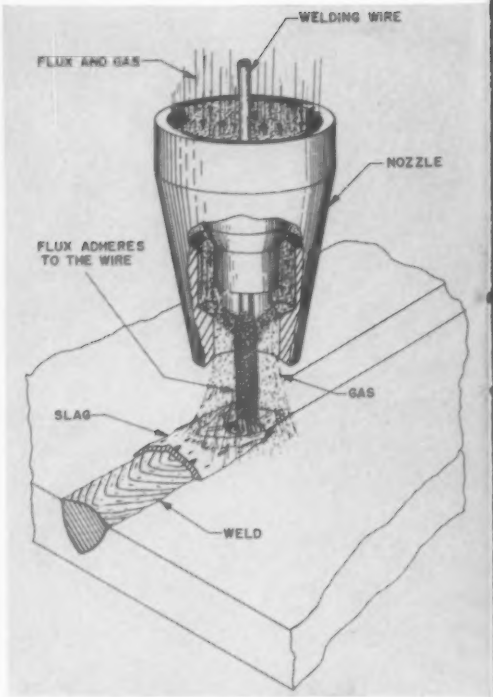
In vertical and overhead positions, deposition rate is said to be two to three times greater than with coated electrodes.

Operator Does More Welding

Since the process utilizes a continuously-fed electrode, operator can devote more time to actual welding. Higher operating factor in combination



An INDUSTRY & WELDING Report



Welding wire and flux issue simultaneously from welding torch nozzle as operator pushes two-way control switch on torch. When welding current is flowing, flux is attracted to and coats wire. Flux is carried to nozzle in carbon dioxide gas stream which also shields weld.

with greater welding speeds significantly reduces unit labor and overhead costs.

Process can be used to weld across gaps and along seams containing moderate amounts of rust, scale and moisture without affecting weld soundness. Surfaces, including those which have been flame cut, can be joined with no preweld preparation of the joint, such as grinding or wire brushing.

Welding tests were conducted on steels whose properties represent 75 percent of all mild steel fabricated in this country. These test steels conformed to most common A.S.T.M. classifications, such as A7, A201, A212, A283 and A285.

All welds showed excellent quality. They easily met radiographic requirements of A.S.M.E. boiler and pressure vessel code. Fillet, butt and plug welds, as well as welded repairs in steel castings, showed consistently high radiographic quality.

Tests on multi-layer welds indicated completely satisfactory soundness and bending properties.

Typical mechanical properties of welds in A212 steel are 75,000 to

Flux hopper is important part of new equipment. Other components include wire supply mounted on rotating assembly, control unit and welding torch.

85,000 psi tensile strength, 65,000 to 75,000 psi yield strength; elongation in 2-inches is 25 to 35 percent, reduction in area is 60 to 70 percent. Welds have an impact value of 15 foot-pounds at minus 40°F.

Common Steel Bare Wire

In Unionarc welding, a bare wire electrode of common steel composition is continuously-fed from a 300-lb. capacity reel through a flexible tube to the torch. Wire is kept clean by a covered pack which provides at least one week's supply under average welding conditions. Called "Pay Off Pack", it is supported and rotated on a motor-driven turntable, controlled so that wire tension at the feed rolls is minimized.

Process eliminates frequent stops to change electrodes, as well as the usual starts and stops in making a joint. Stub loss is completely eliminated and deposition efficiency increased to practically 100%.

Specially compounded and carefully produced magnetizable flux is placed in a dispenser and fed from this point through a flexible tube to the torch. Dispenser is designed to measure exact amount of flux in proportion to amount of wire that is being fed. It can be adjusted to feed different flux-to-wire ratios, but the usual ratio is between ⅜ to ½ pound of flux per pound of wire. This predetermined ratio is automatically maintained regardless of rate of wire feed.

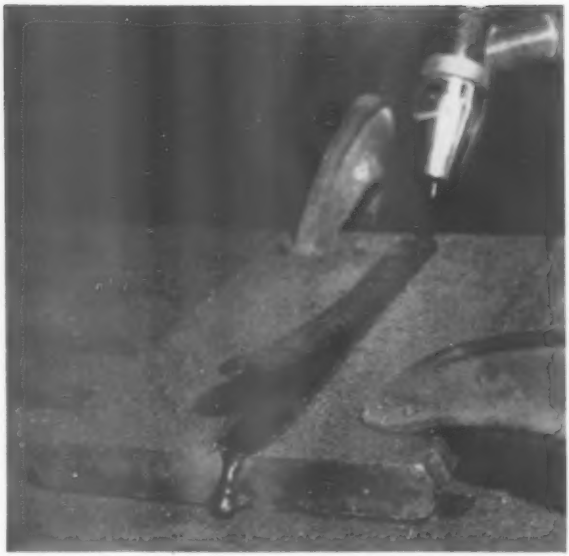
Flux Fluidized in CO_2

Flux is fluidized at dispenser in a stream of welding-grade carbon dioxide gas. Supplied from the usual commercial containers, gas flows at about 35 cubic feet per hour and is regulated as to pressure and flow. Flux is suspended in the gas stream and carried to the torch.

At torch nozzle, magnetic field created by electric current passing through the wire magnetizes and attracts the flux to the wire. As a result, wire is "coated" continuously as it is fed into the arc.

Flux Does Four Jobs

The flux melts and does four important jobs: (1) together with shielding gas it stabilizes and protects the arc and stream of molten metal passing through it to the puddle from atmospheric contamination; (2) it refines molten metal by deoxidization, (3) it provides



As welds cools, slag rise becomes even more apparent . . . characteristics of new process have eliminated pre-weld cleaning of plate and greatly reduced post-weld cleaning time.

desired control of weld contour by its effect on surface tension and (4) it slows down cooling rate of weld metal by its blanketing and insulating action.

This new flux differs from the magnetic flux-method in that it is a low hydrogen-type flux which is non-gas producing. It develops high tensile strength welds with very good ductility.

Welding current is supplied by a direct current power source. A constant potential rectifier adds advantage of easy and uniform starting and control of arc length.

Develops Little Spatter

Arc characteristics of the process are similar to those of coated electrode welding. Under most conditions, metal transfer is "spray-type" and very little spatter is developed. This spatter is not tenacious and can, in most cases, be readily removed by wiping or light brushing.

Techniques used are comparable to those employed with most commonly used coated electrodes. Manual skill and dexterity requirement are equivalent to, or slightly less than those for coated electrode welding.

Wires of various diameter can be used. However, requirements of most applications can be met with wide operating ranges of $\frac{3}{32}$-inch and $\frac{3}{64}$-inch diameter wires. Present Unionarc equipment was designed around those two wire sizes, but process is not limited to them.

For flat and horizontal welding, wire of $\frac{3}{32}$-inch diameter is used over a current range of approximately 350 to 450 amps, DC reverse polarity, with a flux-to-wire ratio of 0.5 lbs. of flux to wire.

Undercut-Free Fillets Easy

Single pass fillets up to 1-inch leg size can be made in the flat position and single pass fillets up

(Turn to Page 69)

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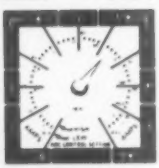

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A.W.S. Spring Meeting and Welding Exposition in Philadelphia, April 8 to 12

WHERE and how welding is being used in the fabrication of nuclear power plants will be the subject of two technical sessions at the forthcoming National Spring Meeting of the American Welding Society. The meeting will be held in conjunction with the Fifth Welding and Allied Industry Exposition in Philadelphia, April 8-12.

A.W.S. Honors Founder

In honor of the founder and first president of the American Welding Society, Comfort Avery Adams, the 1957 Spring Meeting of the Society will be known as the Adams National Meeting, 1957.

Several papers will discuss welding problems involved in designing and fabricating nuclear reactors. Recently developed procedures and techniques for welding reactor components will also be described. Other papers will cover the effect of neutron radiation on weldability and mechanical properties of structural metals.

Highlight of the meeting will be the annual Adams lecture delivered by DeWitt C. Smith, chief metallurgist, electrode division, Harnischfeger Corp. His topic will be "Evolution of High Tensile Weld Metal with Low Hydrogen Electrodes."

A special feature of this meeting will be the sponsoring of three sessions by the Committee on Electric Welding of the American Institute of Electrical Engineers.

Paralleling the arrangements made with the A.S.M.E. for the 1956 Spring Meeting, the A.I.E.E. will meet with the A.W.S. in Philadelphia and sponsor papers that are of similar technical interest to both groups. Two of the sessions will deal with resistance welding; the third will cover arc welding.

A total of 18 sessions are planned for the 5-day meeting. In addition to the above mentioned papers, latest developments in other fields of welding activity will be reported. These include welding of titanium and zirconium; brazing stainless steels and high-temperature alloys; new techniques in precision welding control; filler metals for welding high-strength steels; zinc soldering of aluminum; welding of missile airframes and the use of welding in foundries.

Two of the sessions will be de-

(Continued on Page 71)

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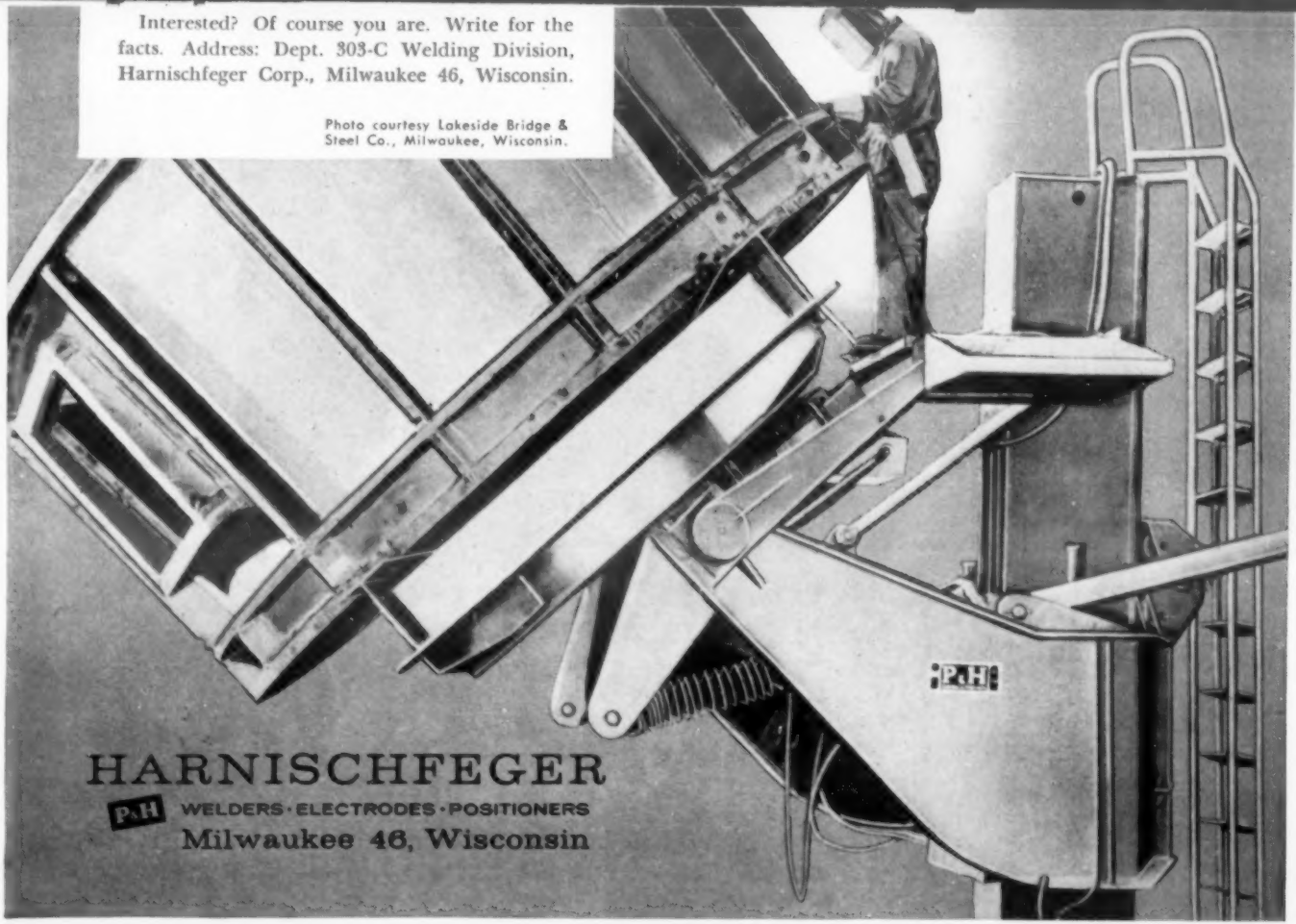
Photo courtesy Lakeside Bridge & Steel Co., Milwaukee, Wisconsin.



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Seven Things to Know About Inert Arc Welding Stainless Steels

A Good solid jig is needed for clamping. Stainless steel shown here is held flat in jig on top of copper back-up bar.

B Square butt weld joins two pieces of thin ⅛-inch stainless steel. Work could be much wider if required.

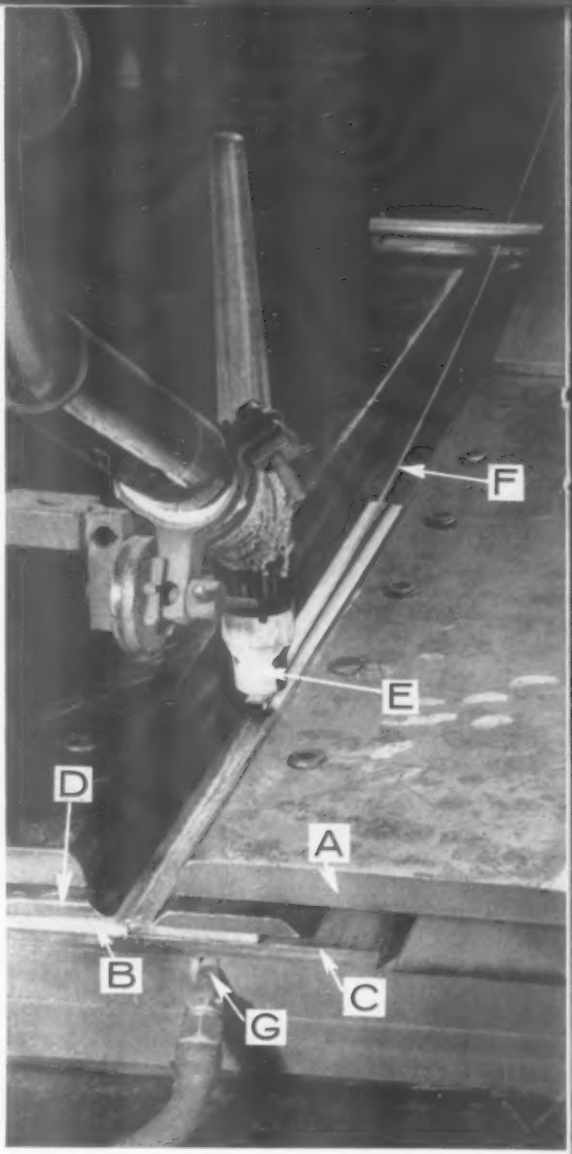
C Copper back-up bar usually has a relief groove 3/16-inch wide by .007-inch deep beneath seam. Inert gas is sometimes passed through this groove to protect molten weld.

D Hold-down bars can also be made of steel. Bars hold work in flat position.

E Any standard inert gas tungsten arc torch can be used; it is carried along the seam by motorized carriage or tractor.

F Pre-placed filler wire is melted into joint to provide a small weld reinforcement. Filler wire is elevated one end to help keep end being melted on center of weld joint. Filler wire could also be added by a mechanized wire feeder.

G Water line keeps lower part of welding jig cool; this keeps distortion to a minimum.



by W. E. McFee,
Supervisor, Product Information Service
Armco Steel Corporation

A REVIEW OF INERT ARC WELDING
(Stainless Steel)

INERT-GAS shielded arc welding is widely used with excellent results on stainless steels. An atmosphere of inert gas is utilized that (1) eliminates the need for a flux and (2) prevents chemical change of elements in the alloy that normally would combine with oxygen or nitrogen at fusion temperatures.

The method offers these advantages in making stainless steel weldments:

It eliminates flux cleaning after welding or between passes in multiple bead welding.

Reduce Finishing Time

Refinishing time is shortened because much less weld bead grinding is required. Joints are sound and smooth and notably free from spatter or scale. Only a very light oxide forms on the surface along the weld seam.

The conventional torch consists of a head with a single tungsten electrode mounted in its center. The electrode arc and weld puddle are shielded from the air by dispensing gas around the electrode. Work is grounded in any convenient manner.

The tungsten arc is used mostly on the lighter thicknesses up to ⅛ inch. Usual practice is to weld without filler rod. Where necessary, filler metal may be added either by hand feeding or preplacement of bare wire or stainless sheet trimmings.

Manual operation of the torch is satisfactory for many jobs, but there are distinct advantages in mechanizing torch movement or work.

In mechanization, the torch can be mounted on a type of tractor used for a cutting torch. The track must be parallel with the work surface. The arc gap is then pre-set to remain constant while welding. Tungsten electrode loss is little. Filler metal can be added by preplacement of wire or by use of a filler wire feeding machine.

Complete automatic welding is done on equipment in which the arc gap is regulated by an electrical circuit. For full joint penetration, and to minimize distortion, a copper or steel back-up bar with a shallow groove directly beneath the seam is generally used and helps prevent burn-through. This set-up when combined with mechanical movement produces stainless weld joints at high speeds. Surfaces are smooth and penetration uniform.

Use Argon or Helium

Both argon and helium are effective shielding gases for welding stainless steels. Use of other gases is questionable. About 12 cubic feet per hour are required for most manual operations. Helium usually is favored because it costs less. Even so, each gas gives different electrical characteristics to the arc;

High frequency alternating current superimposed on regular welding current will start the arc without touching electrode to the work. This minimizes chances of contaminating electrode.

Heavier sections of stainless steels are welded with consumable electrode inert arc process. Here, ¾-inch thick stainless pieces are being joined.

so the choice will hinge on operating reasons.

Arc voltage is higher with helium. Changes in arc length will produce considerable variation in arc voltage. This characteristic is used to advantage in equipment employing automatic control of the arc gap. With its higher voltage the helium shielded arc produces more heat for a given welding current. Helium evidently permits welding at greater travel speeds and produces a desirable flat bead showing no undercutting.

The argon arc operates at a lower voltage. Changes in arc length cause only slight variations in arc voltage. This is why argon is so suitable for welding the lighter gages of stainless steel. For these a constant welding heat is needed. Even if the arc length is varied unintentionally, the welding heat will not change to any extent. Where special arc characteristics are wanted, a mixture of argon and helium is sometimes used. To reduce cost of shielding, carbon dioxide gas is sometimes used as a concentric outer covering around the inner shield of argon or helium.

Use A-C or D-C Power

Either an a-c or d-c power supply may be used for inert-gas shielded arc welding of stainless steels. Ordinary d-c motor-generator can be used. Special a-c transformer machines are made for a-c welding. Welding with direct cur-

(Turn to Page 59)

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rent on straight polarity (electrode negative) liberates much greater heat at the work (positive pole), which makes for proper penetration and sound fusion. Reverse polarity produces more heat at the electrode and greatly increases the loss of tungsten.

High Frequency Starting

High-frequency alternating current superimposed on the regular welding current will start the arc without touching the electrode to the work. Contaminaion of the tungsten electrode must be avoided.

Carbon electrodes have been used in the inert-gas shielded arc process but are not recommended for welding stainless steels. There is always the danger of carbon-pick-up which can be a corrosion hazard when the welded equipment is placed in service.

The inert-gas shielded arc made possible a new method of spot welding stainless steels. It did away with forging pressure, and spots are made from one side of the metal with a pistol-grip gun. The process can be used in place of resistance spot welding. It offers lower initial equipment cost and easier portability, but there is the disadvantage of higher cost per spot. It works exceedingly well in spot welding assemblies accessible from only one side; also where a thin sheet of stainless steel must be spot welded to a thick base member.

Inert-Gas Spotwelding

Inert-gas spot welding can be used on stainless sheets from about 0.030 to 0.070 inches thick. Top or face sheet in a lap joint must be in intimate contact with the backing sheet. Fusion extends through the face sheet but only part way through the backing sheet. No filler metal is added.

An ⅛ or 5/32 inch diameter tungsten electrode is used with argon or helium as the shielding gas. Current for the arc can be either a-c or d-c straight polarity. A high frequency current must be supplied to start the arc without grounding the electrode. Gas flow and arc time are controlled by a timing device.

Consumable Electrode Welding

The consumable electrode method extends the use of inert-gas arc welding to heavier sections of stainless steels. It uses a consumable electrode and deposits continuous filler metal. The method is reported to have these advantages: (1) a continuous high rate of filler metal deposition (2) deep penetration with the least edge preparation, (3) no time required for removal of slag or flux, (4) little or no loss of such oxidizable elements as aluminum and titanium from the stainless steel electrode wire.

A coil of small diameter bare filler wire is fed through a water cooled welding head or gun. The wire serves as an electrode to support an arc directly on the joint. A stream of argon, helium or a mixture of both discharged from the gun shields both the arc and weld pool. Exceptionally high welding current can be applied for deep penetration and rapid deposition of the electrode wire. The welding head can be used for either manual or mechanized operations.

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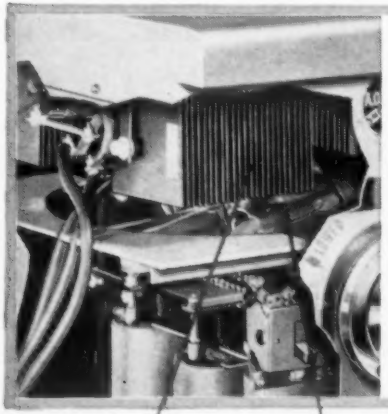

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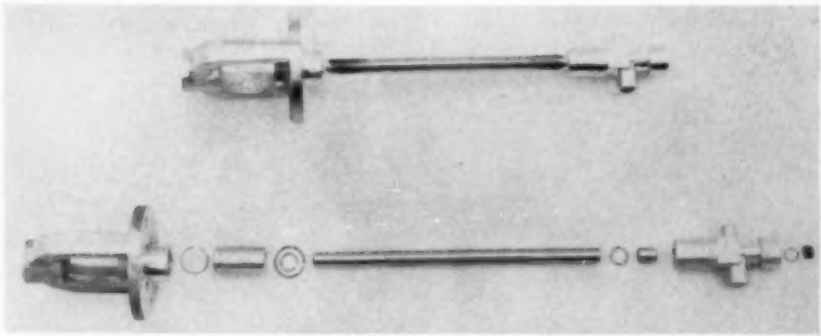
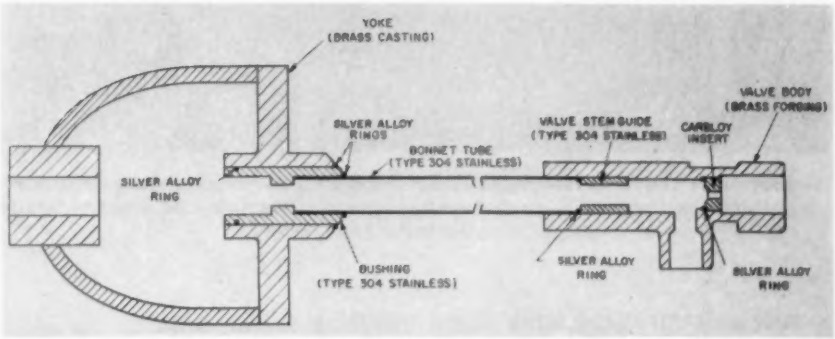
Production has been tripled on expansion-valve assembly by new rotating fixture. Multiple burners reduce heat time for heavy brass parts. Water stream cools parts for safe, easy handling.

300 Silver Brazed Joints Simplify

Many classes of dissimilar metals are brazed together by this manufacturer. These include various combinations of Type 304 stainless, cast and forged bronze and copper, copper-bronze and Carboloy . . .

A LIST of all the joints made routinely by silver alloy brazing in the large air separators manufactured by Air Products Incorporated, Allentown, Pa., would furrow the brow of even an experienced production engineer. By the fractionation of liquified air, these separators produce tonnage quantities of high-purity oxygen and/or nitrogen for many industrial uses.





Six dissimilar metal components used in expansion-valve assembly include cast brass yoke; forged brass valve body; stainless steel bushing, stem and valve stem guide, and a Carboloy seat.

Fabrication of Dissimilar Metals

300 Brazed Joints

A typical air separator contains more than 300 silver brazed joints of widely different size and complexity. The one common denominator is the reliability required to withstand severe and prolonged conditions of operation. Joints in various parts of the separators are exposed continuously to temperatures ranging from -300° F to several hundred degrees and to pressures approaching 5000 psi.

Many classes of dissimilar metals are brazed together in combination: Type 304 stainless steel, cast bronze, brass, copper, copper bronze, and Carboloy. Some joints are less than ¼ inch in diameter, others range up to 54 inches in diameter. Metal thicknesses vary from .025-inch up to 1½-inch.

Seventy-eight closely spaced copper tubes are brazed to heavy wall copper header ring of heat exchanger. Work is done by a two man team, one of whom preheats header ring for better joint quality.

It is doubtful if any other single joining method could be adapted to fill this variety of production requirements, besides offering the strength and oxidation resistance needed for long service life.

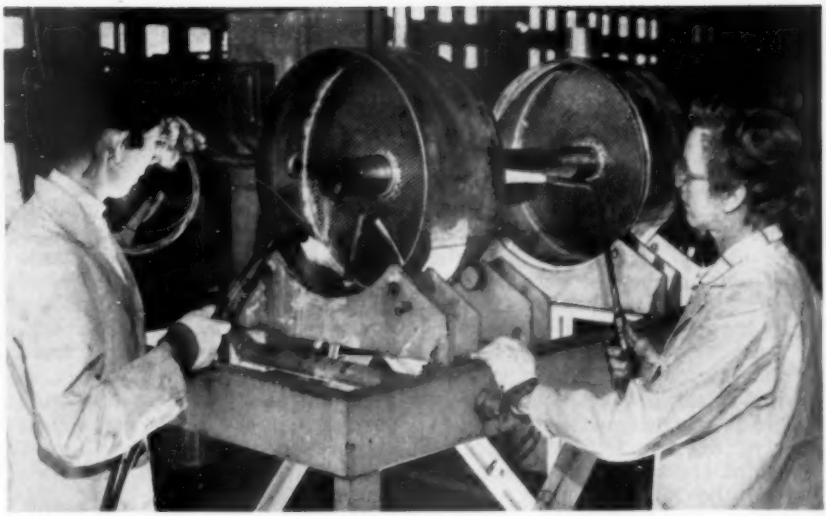
The accompanying photographs furnished by Handy & Harman are typical operations in which Air Products adapts silver alloy brazing to its complex production picture:

Braze Copper to Copper

In one operation dozens of individual ¼-inch O.D. copper tubes, with wall thicknesses ranging from .025 to .050 inch, are brazed into a heavy wall (⅜ inch) 2-inch O.D. copper header ring. The heat exchangers for the larger separators contain several sections, each with many tubes terminating to a header ring. About 35 minutes are required to complete each bundle of joints.

The brazing is done by a two-man team, one of whom preheats the ring ahead of the brazing. Preheating is necessary to bring the large mass of the header ring up to temperature in the shortest time practical. Pre-heating the entire diameter of the header distributes expansion stresses uniformly and helps insure joints of uniform quality. A No. 8 single-orifice torch tip is used for pre-heating, a No. 5 tip for brazing. An oxy-acetylene mixture fuels the torches. Before assembly, the headers and tubing are degreased, and then fluxed during fit-up.

During the brazing, the pre-heating torch works on the opposite side of the header and 4-6 inches ahead of the brazing torch so that each section of ring is close to the brazing temperature as the



Air-tight joint between copper tube sheet and copper-bronze sleeve is made by silver brazing. One operator face-feeds wire from front, while her partner heats from back to draw molten alloy through.

brazing operator moves in. The silver alloy used contains 35 percent silver, 26 copper, 21 zinc and 18 cadmium. The relatively longer melting range (1125° to 1295° F) and somewhat high viscosity of this alloy when molten permits better control of run-off in the hard-to-heat, closely-spaced bundles of tubing. When the joints are completed the flux is removed by laying wet rags on the header while still hot. The resulting quick cooling flakes off the adhering flux and permits easier clean-up.

Copper to Copper-Bronze

Another operation probably represents one of the longest continuous joints being made by silver alloy brazing in any industry. This part, which forms part of the liquid-gas condenser section, consists of a perforated circular copper tube-sheet brazed to the interior wall of a copper-bronze sleeve. Depending on the size of the unit, the tube sheets will vary from 3/16 to ¼-inch thick. Thus, the largest units contains about 170-inches of continuous silver brazed joint, 1½-inch thick. In service the joints are continuously exposed to a temperature of -300° F and a pressure of 80 psi, exclusive of mechanical loading.

In the operation a ¾-inch thick tube sheet is brazed to a 3/16-inch thick sleeve. The brazing is done by a team of two working on opposite sides of the tube sheet. Because of the heat required for the exceptionally heavy gage parts, a propane-oxygen flame (10 psig propane, and 25 psig oxygen) is used.

At the start, both operators thoroughly pre-heat the edges of the tube sheet. Both torches are

equipped with multi-hole tips to produce a long bushy flame for splash heat. Considerable care must be taken not to overheat the copper-bronze sleeve, which has substantially less mass than the tube plate, otherwise porosity will result. Most of the heat is directed near the edge of the tube sheet and the sleeve is thereby heated at the proper rate by a combination of splash heat and conduction.

The brazing requires a high degree of teamwork. Both sides of the joint are heated simultaneously and the 35 silver alloy is face fed from the front. The operator at the back must apply enough heat to draw the brazing alloy all the way through the joint until a fillet appears to assure a solid, leak free seal. About 30 minutes is needed to braze the 85-inch long joint in this 27-inch diameter plate. Inlet and outlet connections are also brazed at this time.

Prior to assembly all parts are degreased with trichlorethylene and any adhering oxides removed with a wire brush. Fluxing is done prior to pre-heating. Following the brazing, the assembly is dipped in hot water to remove adhering flux and then in a strong alkaline solution to remove any oxides produced during the heating.

Braze Stainless to Brass

Another interesting brazing job is an expansion valve assembly, consisting of six individual parts, including a cast brass yoke and a Type 304 stainless steel bushing at one end, and at the other end, a forged brass valve body, containing a Carboloy seat and a stainless steel valve stem guide. A ⅝-in. O.D., .065-in. wall stainless steel tube extends between the valve body and yoke.

These six pieces are brazed together at one pass using five alloy rings. Fitting tolerances are maintained between .003 and .006-inch. Before assembly the stainless steel parts are prepared by degreasing in trichlorethylene and are given a brushed satin finish on the areas near the joint surfaces to remove surface oxides. Brass components are prepared in a hot dip followed by a chrome acid dip and water rinse.

The expansion valve is assembled, fluxed and loaded onto a simple, efficient, mild-steel fixture bolted onto uprights on a rotary, indexing brazing table. In accordance with good brazing practice, the valve assembly is supported rather than clamped to permit expansion during the heating cycle. The fixture supports the assembly at the base of the yoke and holds it upright by means of a U-shaped piece, which is closed by a simple swiveled catch and fits around the vertical tube. The assembly is essentially self-fixturing, the weight of the parts serving to keep the various components in alignment.

Careful Heat Direction

The brazing table consists of five stations, the first two being heating stations and the last three for air and water cooling. Three oxy-acetylene torches directed on the heavy brass yoke melt the two external rings as well as the ring inside the yoke by soaked-up heat. Directing the heat on the yoke prevents damaging the stainless steel tube, since stainless is a poor conductor and can be overheated

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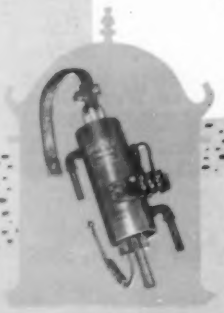

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Gripping cam is actuated by pull on the lifting shackle. Gripping power increases as load becomes greater. Manual operation of locking lever causes clamp to *snap lock* on plate or assembly and *snap open* for easy removal.

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easily. Similarly, three torches playing on the valve body at the upper end of the assembly, braze the valve guide and Carboloy insert in place.

The torch heads are mounted on copper tubing which is sufficiently flexible so that the torches can be positioned to direct the heat exactly where needed. This arrangement also permits the torches to be repositioned conveniently for brazing other parts on the same table.

Production Is Tripled

The table is driven by compressed air or nitrogen, through a solenoid-operated piston actuated by a timing relay. This relatively simple set-up silver brazes approximately 20 valve assemblies per hour — a total of 100 joints — with one operator. Formerly, this part was done by hand torches at the rate of about six assemblies per hour. The table has stepped up production considerably because it heats both ends of the valve simultaneously and concentrates the required amount of heat on the heavy castings to get more rapid and uniform heating of the internal joints than could be achieved by hand torch.

Carborundum Expands

The Carborundum Company will build a new multi-million dollar plant in Van Wert, Ohio for the manufacture of high volume, small abrasive wheels, according to an announcement by Clinton F. Robinson, president of the firm in Niagara Falls, New York.

The new plant at Van Wert, Ohio is part of Carborundum's $30,000,000 modernization and expansion program scheduled for 1957 and '58.

NEW WELDING PROCESS . . .

(Continued from Page 48)

to $\frac{3}{8}$-inch leg size in the horizontal position. Single pass $\frac{5}{16}$-inch size lap fillets are easily produced. Larger fillets are usually made by multi-pass welding. Undercut-free fillets can be produced without difficulty even with high welding current and with speeds of about 25 ipm.

Butt welds are easily made in the flat position. Multi-pass techniques are used for welding thick materials. Root passes can be readily applied in joints where gaps are encountered and in many instances the process will be ideal for providing backing passes for submerged arc welding.

All Positions—One Wire Size

Welds can be made in all positions with $\frac{3}{64}$-inch wire and flux-to-wire ratios in the range of 0.3 to 0.6. Welding currents used vary from 125 to 250 amps, DC reverse polarity, depending upon joint design and position of welding. Lap, tee-fillet and butt welds can be readily produced in all thicknesses of material and in all positions. Multi-pass techniques are used on heavier material. Both straight line and weaving techniques can be used.

The new Unionarc UAM-1 welding machine consists basically of four pieces of equipment.

The first is an air-cooled manual welding torch rated 450-amps continuous duty which houses welding power, gas and flux services within its handle.

(Please Turn Page)

When heavy, unwieldy weldments like these diesel crank cases can be quickly swung into any position so that every weld is made downhand — that's efficient welding!

Welders spend more time welding — do better welding at lower cost when they work with C-F Positioners because these hand and/or power operated machines reduce positioning time to a minimum. Investigate the cost-saving advantages of C-F Positioners. They pay their way in any company.

Write for Bulletin WP26 —an illustrated circular detailing the Specific advantages of C-F Positioners.

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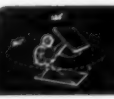

C-F positioned welds mean better, more economical welds

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The second is the powder dispenser assembly which is really a flux-storage and metering device. Required amount of flux is discharged into the stream of gas at a controlled rate to obtain best welding conditions. Assembly is made up of three sections: hopper assembly, magnetic drum assembly and gas-flux control valve.

Uses Constant Speed Control

Third part of the equipment is constant-speed welding control. Besides maintaining constant wire-feed rate, unit controls operation of welding current contactor, gas-solenoid valve and wire pack drive motor.

Basic mechanical assembly is the fourth part of this new process. It is composed of various power assemblies needed to supply welding wire and flux to the weld zone. These assemblies, along with powder dispenser and control, are mounted on a wheeled frame assembly so that entire outfit can be moved readily.

Basic Wire Drive

Welding head assembly is the basic wire-drive mechanism for the machine. Power for feeding welding wire is supplied by a special DC shunt motor.

Welding heads are available in two separate gear ratios: a 95:1 ratio and a 54:1 ratio.

Other parts of the basic mechanical assembly include a magnetic-drum drive and wire pack assembly which is driven by a 115-volt, 60-cycle, 1/20 horsepower motor.

For more information on this new development, write Editor, INDUSTRY & WELDING Magazine, 812 Huron Road, Cleveland 15, Ohio, or Circle No. 175 on Reader Service Card.

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An extra pair of hands, six magnetic faces for holding pipes, bars, angles, plates or sheets, operated by the turn of a handle, suitable for use in connection with all classes of welding.

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A.W.S. SPRING MEETING . . .

(Continued from Page 51)

voted to the latest advances in welding research. Subjects to be covered include factors affecting weld toughness and the influence of design on brittle fractures.

All technical sessions will be held at the new Hotel Sheraton, A.W.S. headquarters for this meeting. The Welding Show, featuring exhibits and demonstrations of the latest equipment, filler-metals and supplies used in the welding industry, will be located at Philadelphia's Convention Hall.

Attendance at the concurrent events is expected to exceed 10,000 for the first time.

Advance registration tickets and hotel information may be obtained from Robert T. Kenworthy, exposition management, 12 East 41st Street, New York 17, New York.

Stud Welding Awards

Gregory Industries, Inc. has established a $1,500 cash award to be presented annually for the most outstanding contribution to the further development of electric arc stud welding.

In addition the engineering school or college whose students and faculty shall have submitted the most outstanding group of entries in this competition will be presented with a complete stud welding unit, including gun, timer and a generator power source, valued at approximately $1500.00.

Entry blanks and information on this competition may be obtained from Gregory Industries, Inc., Lorain, Ohio.

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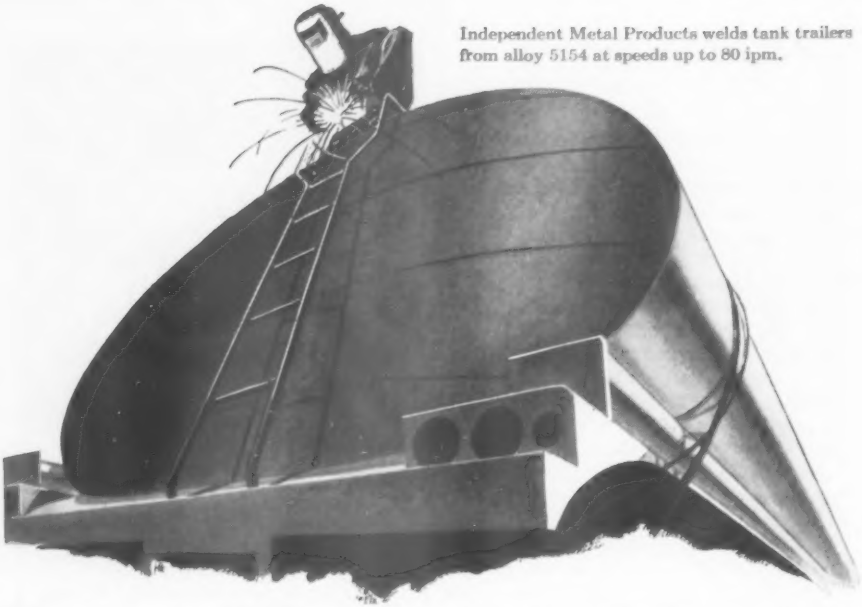

Independent Metal Products welds tank trailers from alloy 5154 at speeds up to 80 ipm.

They're welding aluminum tank trailers at speeds up to 80" per minute!

Alcoa's 5154 alloy is going over big with trailer builders such as Independent Metal Products Division of Fruehauf Trailer Co.

It has good forming characteristics combined with great strength and ductility in welded sections. Moreover, it can be welded at speeds up to 80 inches per minute by the inert-gas shielded arc consumable-electrode welding method.

Production welds of alloy 5154, using parent alloy for filler wire, have excellent ductility . . . 39% elongation in the weld metal when a joint is bent until it fails.

With these improvements, aluminum tank trucks make substantial weight savings—savings that are turned into extra payload profit. At the same time, tank shell strength is increased . . . and accident damage is reduced. Aluminum tanks absorb substantial distortion without cracking or weld failure. One large tank truck operator says:

"In actual operating conditions—5,175,000 miles—our aluminum tanks have proved to be safer than tanks constructed of steel, particularly in resistance to rupture on overturn."

Alcoa® is headquarters for fresh, exciting ideas on how to weld, braze or solder aluminum. Get in touch with us. Where? See information at right.

Learn how easy it is to weld, braze or solder aluminum. Write for free, informative books and films. Aluminum Company of America, 1742-C Alcoa Building, Pittsburgh 19, Pa.

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Want technical help in welding, brazing or soldering aluminum? Contact your Alcoa sales office, listed under "Aluminum" in the Yellow Pages of your phone book.

For immediate delivery of Alcoa welding products, call your Alcoa outlet listed below. He carries a complete range of alloys and sizes.

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Your Guide to the Best in Aluminum Value

Visit the Alcoa Booth at the Welding Show — Philadelphia, April 9-11.

Circle No. 95 on Reader Service Card.

Although operators of aircraft resistance welders need not be highly skilled, they are carefully selected, trained and tested to produce consistent, high quality welds.

Settings for welding stainless steel structural assemblies on this three-phase welding machine determined empirically from data obtained from numerous test welds.

APPROXIMATELY 25 years of development work are now being climaxed by the rapidly-growing use of resistance welding equipment in the production of aircraft structural assemblies.

Resistance welding was, with few notable exceptions, confined to the manufacture of nonstructural assemblies in the aircraft industry prior to the outbreak of war in Korea. It was extremely difficult to produce machine welds with the consistent qualities that are essential to maximum structural strength. However, experience gained in the assembly of nonstructural parts was long ago sufficient to convince aeronautical engineers that it would be economically desirable to develop resistance welding to the point where it could be used in place of riveting techniques.

Experimental Welder

One of the first experimental efforts to use resistance welding equipment in the assembly of a major aircraft structure took place in the Northrop Aircraft plant at Hawthorne, Calif., back in 1933. It involved the construction of an all-metal wing using a homemade seam-spot welder. It was a single-phase, rocker-arm machine with internally cooled, gear-driven weld wheels—capable of welding .040" layers of aluminum or stainless steel alloys.

Despite the relative crudeness of the welder, the experimental wing had structural integrity. However, physical tests disclosed so many

Test welds are made periodically during each production run of structural parts. If they fail physical test minimum requirements, welder is taken off production.

Aircraft Industry Makes Most of Resistance Welding

. . . for 5 important reasons:

1 **Spot or seam welds can be produced in less than half the time required to drive rivets.**

2 **Resistance welds permit increased "pay loads" airplane can carry by completely eliminating weight of rivets in assembly of various parts.**

3 **All things being equal, resistance welds are stronger than riveted joints.**

4 **Perfectly smooth streamlines are attained on external surfaces of airplanes if parts are resistance welded.**

5 **A good resistance-welded assembly has structural integrity superior to a riveted assembly of the best quality. The latter tends to develop loose joints and leaks over a period of time.**

small welding defects — such as cracks and inadequate penetration —that the production use of resistance equipment on structural assemblies had to be postponed indefinitely.

Manufacturers outside of the aircraft industry had improved resistance welding equipment to such an extent that, in 1942, Air Force officials authorized the limited production of spotwelded structural assemblies for military airplanes. Extensive controls and rigid inspection procedures were devised to assure the consistent quality of the assemblies. And results, from an economic point of view, were good.

Process Netted Big Savings

For example, where riveted tail

Resistance welding makes possible high quality, high production structural assemblies for modern aircraft.

booms for Black Widow night fighters had cost about $1200, spot-welded tail booms for the same planes were produced at a cost of only $500. Moreover, spotwelded assemblies were of superior quality.

However, resistance welding remained a secondary assembly process in the aircraft industry until the Korean conflict began. This "policing" action provided the impetus for gradual—then accelerated application of resistance welding to aircraft parts.

Many of the older types of resistance welding machines are now being used to produce aircraft structural assemblies, since their performance is adequate where satisfactory production controls and inspection methods are employed. However, where new equipment has been required to boost production quotas, aircraft engineers have manifested a marked preference for three-phase welding machines.

Why Three-Phase Welders

Reasons for this are:

(1) Three-phase machines facilitate the task of balancing loads on substations and feeders in many circumstances.

(2) Machines using DC welding current usually have the best power factor (about 95%, as compared with 85% on frequency converter systems and 10% to 30% on single-phase 60-cycle welders).

(3) The relatively large throat dimensions of three-phase machines permits the production of many different assemblies in small or limited quantities.

(4) The electronic controls of three-phase machines permits selection of correct and standard settings for different jobs, thus minimizing the need for highly skilled machine operators.

(5) Despite their apparent complexity, three-phase machines can be operated, serviced, or repaired with reasonable economy.

Steel Welds Ductile

One special feature of resistance welders used by companies like Consolidated Vultee is the provision in the welding sequence which allows a weld in steel parts to cool for a predetermined period of time, then introduces a pulse of current which anneals the weld to optimum ductility.

Production controls and inspection procedures used in the aircraft industry depend on the particular job and the welding equipment to be employed.

One example of production control is the use of recording oscilloscopes to check and adjust settings.

DC machines produce an inherently slow rate of welding temperature rise; AC machines, on the other hand, must be equipped with slope control to achieve this desirable regulation.

Machine settings for different materials are, in most cases, empirically determined by data obtained in making test welds. Test values are considered satisfactory if they conform with military specfications.

Test Welds Control Quality

Test welds are made periodically during each production run. Their frequency depends on the nature of the work and the type of welder being used.

Specimens are visually inspect-

The Stoody Guidebook gives full application information on this and other equipment—ask your Stoody dealer for a copy (check the "Yellow Pages" of your phone book) or write direct.

HOW TO KEEP TEETH ON THE JOB

This 7-yard shovel is one of the machines that moved some 6,000,000 yards of overburden in an Arizona stripping job. A few beads of $\frac{3}{16}$" Stoody Coated Electric Tube Borium welded to points of teeth held wear in check, while *one full inch of metal was lost* on unprotected teeth. For longer life on all wearing equipment always specify Stoody products.

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ed, then tested to destruction. And if any test weld fails to meet minimum quality specification, the machine involved is taken out of production until it can be thoroughly checked and readjusted or repaired.

Operators are tested regularly to determine their ability to consistently produce quality welds. They are also encouraged to keep abreast of new resistance welding developments. Moreover, each operator is held solely responsible for the output of his machine. Besides making sure that his equipment is in good working order and properly set for each job, he is expected to reject without welding any work that is improperly cleaned or inadequately aligned at the time it reaches his work station.

Factors for Applying Process

As yet, aircraft engineers have no formula for deciding which jobs should, or should not, be resistance welded. However, their decisions are usually based on the following factors:

(a) Permanence of assembly. If there is no likelihood that the parts will eventually have to be disassembled for repair, maintenance, or service operations, resistance welding is usually the most desireable method of mating parts.

(b) Accessibility of the assembly. The design details of parts must be such that joint areas can

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be reached in welding throat.

(c) Capacities of available welding machines must be adequate to meet thickness-material requirements of the work.

(d) Nature of the materials. Virtually all of the materials now used in aircraft work can be resistance welded, but in some cases incompatibility of dissimilar metals make resistance welding impractical.

Smith Welding Promotes

Lloyd L. McBurney, president of Smith Welding Equipment Corporation, Minneapolis, has announced two executive advancements.

Jack E. Smith, vice president and formerly in charge of production and engineering, will be Vice President and Manager of the newly created Research and Development Department.

SMITH

TAYLOR

Percy E. Taylor, formerly personnel manager of the company, has been appointed Manager of Production and Personnel.

Organize A.W.S. Section in Baton Rouge, La.

A new section of the American Welding Society has been activated in Baton Rouge, La., to bring the total of active sections to 77.

With preformed rings and washers in exact shape to fit your job, you can increase your brazing production. These shaped rings and washers are now produced by Handy & Harman in Easy-Flo and Sil-Fos — the original and time-tested silver brazing alloys.

Add to these fine products, the services of the Whitehead Technical Man whose job it is to help you with equipment and techniques, then you have a money-saving combination that's hard to beat.

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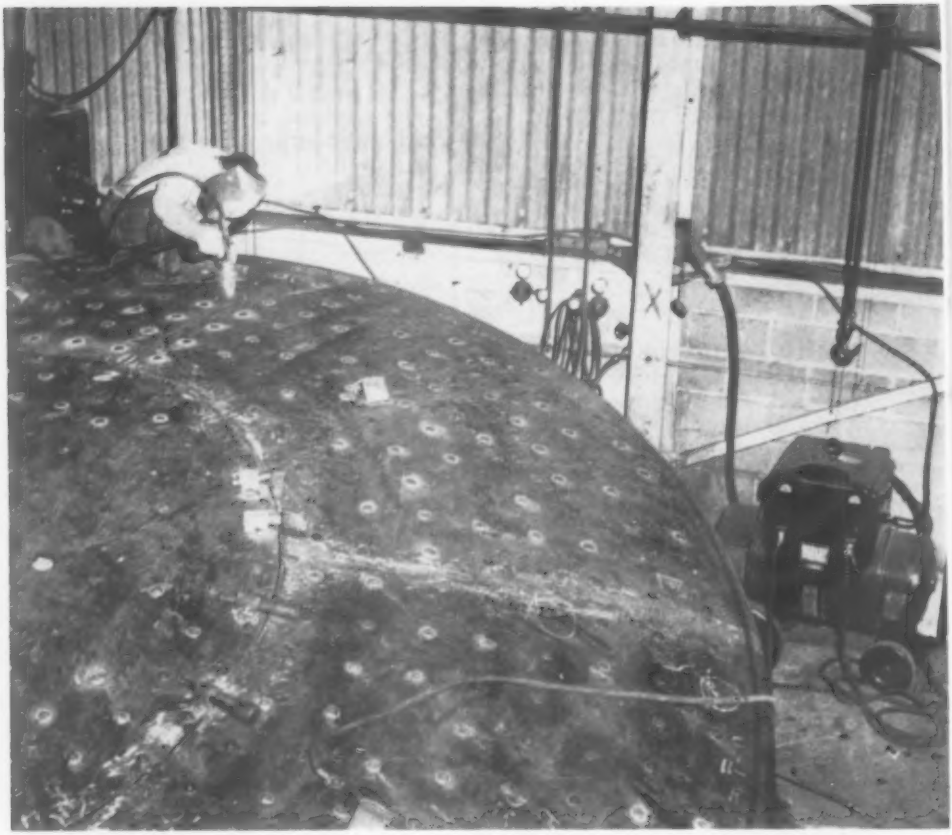
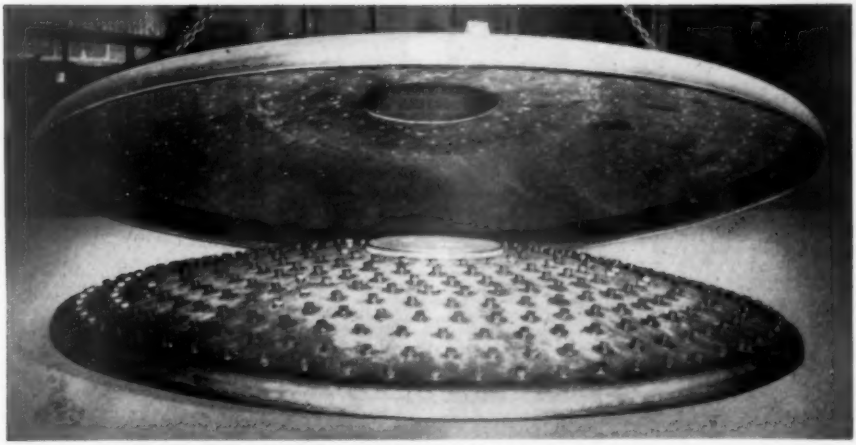


Increased metal deposition rates and better operator control resulted when CO_2 welding was used in plug welding of jacketed heads.

Here's A "Plug" for CO_2 Welding

TO develop a more efficient plug welding technique than those commonly employed was the problem facing Chicago Steel Tank Co., a division of U. S. Industries, Inc. The situation was brought about by simultaneous scheduling through the plant of several steam jacketed stainless vessels involving thousands of stay bolts with one-inch plug welds.

The coated electrode manual welding method involved high labor costs. Automatic welding



Two heads are fitted prior to plug welding (top).

Better appearance which resulted from switch to CO_2 welding is shown in close-up of completed plug weld.

found to be acceptable by experimentation with submerged arc method, but other elements of cost, such as fit-up and positioning made this method prohibitive. Inert gas shielded arc welding was deemed unsatisfactory because pentration achieved did not meet necessary standards.

After conducting numerous experiments and working with local representatives of several welding equipment manufacturers, company developed the more efficient plug welding technique by adapting an active gas shielding consumable electrode welding process.

The higher degree of efficiency obtained was due to several factors. More important were the in-

(Continued on Page 114)

Completely enclosed cutting table has a lid of plates and material to be cut. Oxygen pressure forces powder and smoke into enclosure.

Powerful fan exhausts irritating smoke through duct in side of cutting table into outside atmosphere. Table also catches bulk of slag and scrap.

Special Cutting Table "Clears the Air"

A JOB which formerly gave off billows of dirty, irritating smoke is now handled cleanly and efficiently without operator discomfort at Colonial Iron Wks., Cleveland, O.

Powder burning is a process developed for the torch cutting of such metals as stainless steel, monel, inconel, nickel and clad materials. It introduces iron powder directly into the flame of the cutting torch and makes possible smooth cuts with easily removable, brittle slag.

The problem, however, is the fact that this operation produces a blue smoke that often burns eyes and throat and obscures vision. How to eliminate this drawback was the problem dumped into the lap of Colonial officials when production demanded frequent cutting of these materials.

Usual remedies were tried first. Overhead hoods and exhaust systems were tested. They did not even make a dent in the thick clouds of smoke.

On the second try, Colonial came up with a solution that not only eliminated the smoke problem, but helped streamline their flame cutting operation. Since overhead dust removal failed, they reasoned, maybe a down draft would do the trick. It did.

Colonial maintenance men designed a cutting table that simplified handling of plates to be cut. At the same time it made powder burning so clean that white-shirted engineers have stood alongside the

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table during operation and come away unsoiled.

First a rectangular enclosure about three feet high was built. A frame of angle iron was tacked into place along the inside top edge. This formed a support for sections of plate that are laid on top to form a lid covering the entire top of the closure, except for the area on which the material to be cut is placed. This metal itself completes the lid.

Next they welded an exhaust duct into the side of the enclosure and hooked it up to a fan large enough to exhaust the entire cubic footage within the box-like table.

When powder cutting is done, the normal blast of oxygen carries the powder and smoke down through the cut into the enclosure. The exhaust carries the smoke—irritations and all—out of the building.

Additional advantages of the table are that it catches the bulk of slag and scrap in the cutting operation, keeping surrounding area clean. It also provides a firm base for positioning materials to be cut.

Mid-States Names Rep

C. G. Notley & Co., Inc., Charlotte, N.C., has been appointed Southeastern distributor for Mid-States Welder Mfg. Co. Headed by C. G. Notley, president, firm has been associated with the welding industry for several years and is a member of the National Welding Supply Association.

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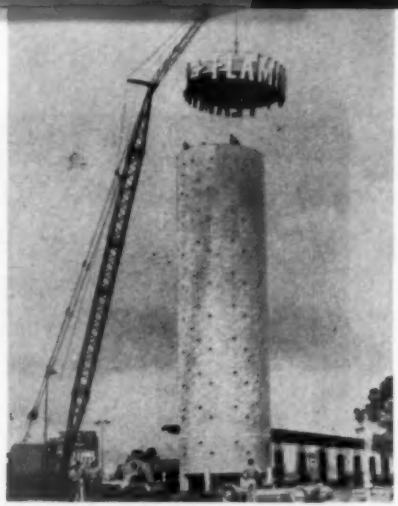

Decorative Welding Job

One of the biggest decorative welding jobs in the West has resulted in this unique "marker" for the entrance to the Flamingo Hotel at Las Vegas, Nevada. The hotel is now identified by this huge 5,800 pound sign, shown being set on top of a 22 foot diameter pylon, using a 22½ ton motor crane equipped with an 80 foot boom plus a 30 foot tip extension. Job was accomplished for the Flamingo by the Lincoln Welding Works Co., of Las Vegas.

Kaiser Takes Over Wire and Cable Business

Kaiser Aluminum & Chemical Corporation has announced purchase of the wire and cable business of the United States Rubber Co. The purchase was effective February 1st and includes U. S. Rubber's insulated wire and cable plant at Bristol, Rhode Island, and its wire and cable inventories.

In addition, Kaiser Aluminum takes over U. S. Rubber's nationwide wire and cable sales organization and network of distributors as well as all Bristol plant personnel.

New instrument measures iron content in weld

The Ferritic Elcometer instantly and accurately measures ferrite content in a stainless steel weld. This new precision instrument replaces time-consuming destructive laboratory analysis. It enables you for the first time to make rapid, on-the-spot, nondestructive tests for iron content at various points along a weld.

Measures magnetic intensity

Operation is based on the principle that increase of magnetic flux intensity between two soft iron test probes of a U-shaped magnetic circuit reduces the forces in a spring-loaded magnetic needle in a parallel magnetic branch. Tension of spring is adjustable so that needle gives scale reading corresponding to ferrite content of standard reference sample.

Accurate readings in all positions

Needle locking device assures correct readings. Balanced in all planes—readings can be taken at any angle. Sturdily constructed. Comes in tough leather case. Fits in pocket. Write today for complete information.

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4139 E. 56TH STREET
CLEVELAND 5, OHIO

Circle No. 37 on Reader Service Card.

INVINCIBLE

Welding Flux Recovery Systems

MAKE 3-WAY SAVINGS

1. Valuable Flux Reclaimed. Automatic Invincibles recover all unfused flux and return slag-free, dust-free usable flux to the welder—all in one continuous operation.

2. Costly Man-Hours Saved. Invincib'es do the complete job automatically — far more swiftly and efficiently than manual methods.

3. Fewer Expensive Rejects. Invincibles remove all fine dust (flux flour), thus reducing welding rejects and speeding production.

Many Important Advantages

- Ruggedly built to resist abrasive nature of flux.
- Compact and lightweight. Variety of mode's and flexibility eliminate need for tailor-made installations.
- Portable units also available.

Operating continuously, this Invincible recovers all unfused flux from pipe-seam welding operation at a leading automotive firm.

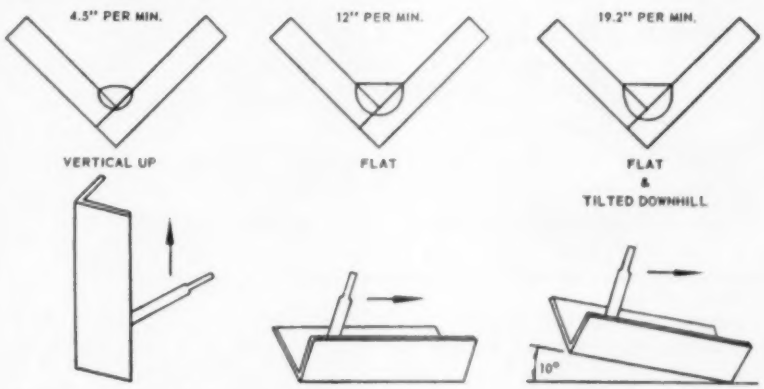
WRITE TODAY FOR FOLDER on Invincible Flux Recovery Systems.

INVINCIBLE VACUUM CLEANER MFG. CO.
DOVER, OHIO

Circle No. 48 on Reader Service Card.

How positioning gives faster and better welds • • •

These are identical weldments. In each position, adjustments were made as to kind of electrode, size and welding current, to get fastest possible welding speed in each position.



VERTICAL UP allowed a maximum of 4.5 ipm welding speed, small bead section.

FLAT position allowed a maximum of 12 ipm welding speed and produced a weld bead section area twice that of vertical up position. Just by turning the weldment 90° we have been able to almost triple welding speed and more than double weld strength. Not shown is the fact that appearance is vastly improved by "downhand" welding in the flat position.

FLAT AND TILTED DOWNHILL 10° allowed a further increase of 60 percent in welding speed, plus even better penetration, further increasing weld strength. Proper positioning has thus yielded an increase in production of 426 percent with a better looking joint more than twice as strong.

POSITIONEERING

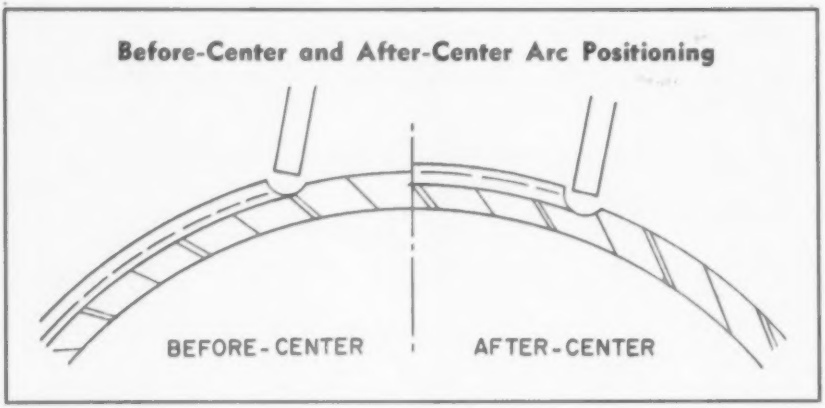
PART 10

How Proper Positioning Increases Welding Speeds

by **CHARLES N. ARONSON, President**
Aronson Machine Company

LET'S examine arc welding a little more in order to get a better picture of positioning for more efficient welding.

Try to see that a weld is much like a casting. To do so is not wrong. Metal is molten in both cases and is affected by gravity. A casting is made by pouring into a mold a quantity of liquid metal. Gravity pulls the metal down to



fill every part of the mold.

In welding, the arc gouges a trough into which flows the molten metal, again, by gravity.

To make overhead welds a certain kind of electrode is needed to apply the molten metal in such a way that it solidifies before it can flow down the operator's neck. Vertical welds are made with a similar type of electrode, the electrode itself and the arc force being used to hold molten metal against gravity until it solidifies.

It seems evident that if we take advantage of gravity rather than fight it, we can get faster and better welds.

Before-center and after-center positioning of the arc on circular and cylindrical weldments has the effect shown above. Weldment is being rotated counter-clockwise, which progresses the arc to the right in relation to the weldment. This is an example of a mechanically held arc, here held stationary while the weldment is being moved. This shows the force of gravity being used to change the build-up and the penetration for weld improvement by positioning.

Before-center arc position (left) has a shallower trough and a higher bead because gravity tends to pull the molten metal puddle downhill to the left toward the bead. Increasing the current and decreasing the rotation speed (travel speed) will increase the size of the bead by deepening the trough and building up the bead. This would be done only if a larger bead is needed. Otherwise, holding highest speed possible will give a weld as shown. There are limits, of course, and only a small amount of jockeying can be done.

After-center arc position is on the right. It is generally faster than before-center arc position. The bead in the example is the same for both arc positions, deeper trough and less build-up for after-center arc. Highest travel speed (most weld per minute) is had by holding trough to the same depth and allowing bead to be flatter, accomplished by an after-center arc position, same current and faster rotation speed.

This example of weld bead control for improved welds can only be accomplished by positioning.

Next month the author discusses downhand welding and how positioning makes it possible.

Circle No. 30 on Reader Service Card.

NOW... a new popular

DE-STA-CO TOGGLE CLAMP

in steel OR ALUMINUM!

Actually this photo shows two models—Model 441 (Steel) and Model 441-A (ALUMINUM)!—identical except 441 is of hardened alloy steel, BUT MODEL 441-A IS OF HEAT-TREATED ALLOY ALUMINUM!

What's the difference? Steel is stronger. ALUMINUM IS LIGHTER! Model 441 (Steel) weighs 10 oz; Model 441-A (ALUMINUM), only 3½ oz! 441 has holding pressure of 350 lbs.; 441-A, 200 lbs.! . . . Use steel for strength; ALUMINUM for lightness, to lessen worker fatigue, or for electronic welding, due to its non-magnetic qualities.

Write for Literature on Models 441, 441-A!

DE-STA-CO DETROIT STAMPING COMPANY

WORLD'S FIRST LINE OF TOGGLE CLAMPS

347 Midland Avenue • Detroit 3, Michigan

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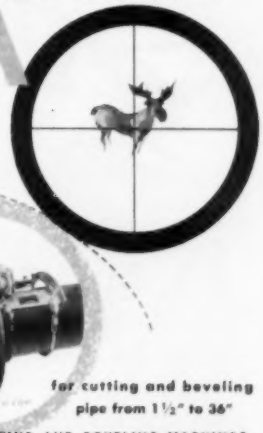
ACCURATE as the marksman's scope



for cutting and beveling pipe from 1½" to 36"

PIPE CUTTING AND BEVELING MACHINES

The precision, accuracy and speed of preparing perfectly square joints for welding pipe from 1½" to 36" — is unequalled when you use H & M Pipe Cutting and Beveling Machines — in the field or in the shop!

Extremely light in weight, yet rugged enough for the toughest job, H & M Machines are simple.

Savings of one-half the cost in labor-gas-and-time in comparison to manual-cutting — makes H & M Pipe Cutting & Beveling Machines the most valuable equipment wherever pipe is welded!

All H & M Machines can be easily and quickly motorized for automatic operation.

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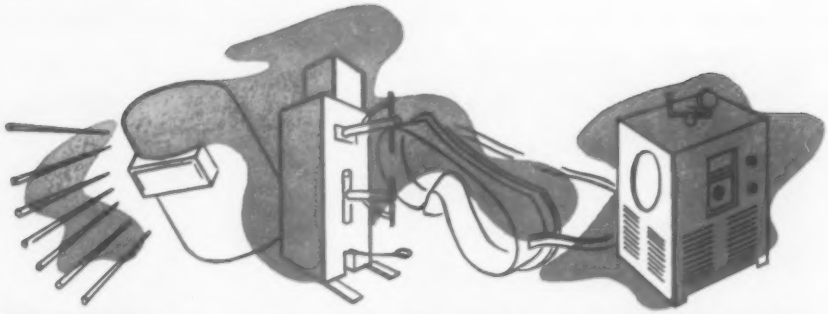


NEW PRODUCTS

Inert Gas Control

A new automatic gas control and economizer for inert gas welding applications has been introduced by Oxo Welding Equipment Co. Model F-55 control starts

and stop flow of gasses to torch and back up or water cooling. Automatic after flow with timer. Rugged unit is compactly built, measuring 9 by 6 by 3½-inches.

Circle No. 140 on Reader Service Card.

Aluminum Brazing Rod

Designed specifically for brazing mitered joints on aluminum screens and storm windows, Miter Al-Braz rod has been introduced by Belmont Smelting & Refining Works, Inc. Rod is said to melt at 720°F, require no flux and closely match aluminum color. It comes in convenient ⅛-inch by 18-inch lengths for easy applications.

Circle No. 141 on Reader Service Card.

FOR ADDITIONAL INFORMATION
Use Reader Service Card for additional information on the products appearing on this and the following pages, mark the key number of the item on the card bound into this issue. Drop the card in the mail—no postage required.

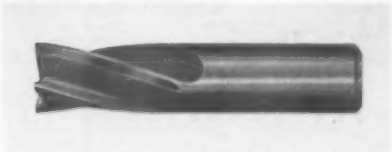
Silver Brazing Flux

A new silver brazing flux which will not harden, stiffen or crystallize and is packed in wide mouth jars for easy extraction has been introduced by American Platinum Works. Should this general purpose flux be allowed to dry out, proper consistency can be restored by mixing in a little water.

Wide mouth jar and non-setting features make all flux accessible and useable.

Circle No. 142 on Reader Service Card.

Carbide End Mills



A new series of solid carbide end mills is now available from Severance Tool Industries, Inc. New mills come in sizes from ⅛-inch to ¾-inch and are said to cut costs on production jobs involving tough, abrasive materials.

They also are claimed to be effective on plastics.

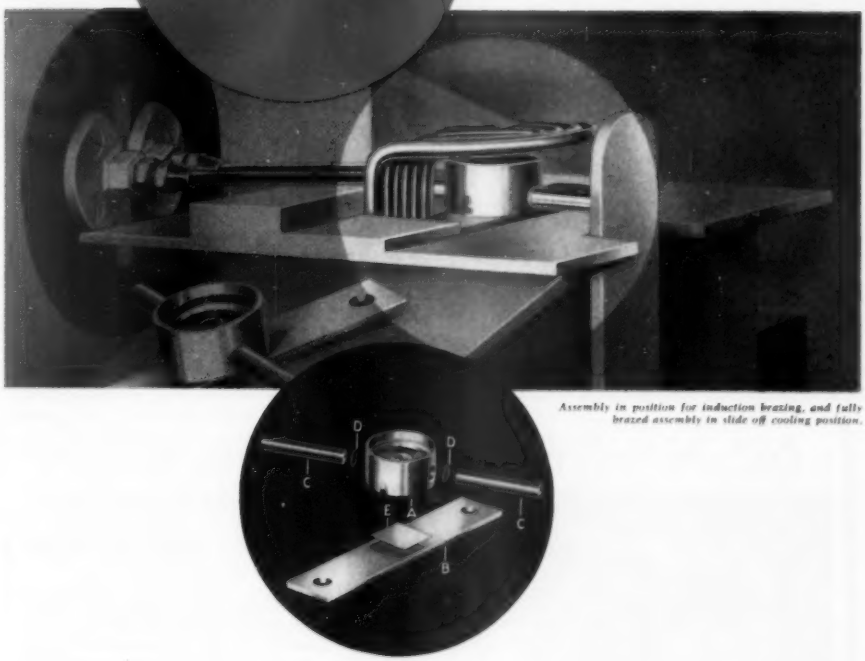
Circle No. 135 on Reader Service Card.

Fog-Proof Lens Tissues

New, chemically treated tissues that will clean and fog-proof glass or plastic-coated safety goggles, glasses or face shields have been announced by Carhoff Company. Used with or without water, tissues are said to be non-abrasive and harmless to the skin.

Circle No. 143 on Reader Service Card.

PHOSON SIMULTANEOUSLY BRAZES 3 GAS-TIGHT JOINTS IN 60 SECONDS



Assembly in position for induction brazing, and fully brazed assembly in slide off cooling position.

This bypass valve, for use with a telephone cable pressurization program, was designed for *strength, gas-tightness, corrosion resistance, long life* and *mass production.*

Here's what the problem involved: a brass machined hub (a) had to be fastened to a plate (b) and two copper tubes (c) fastened to the hub. Because the finished joints had to embody all the requirements of the base materials, low temperature brazing with Phoson and Sil-Flux was chosen. Two Phoson rings (d) ¼" ID x .031 wire and a Phoson shim (e) ¾" square x .003 were specified. By induction brazing with Phoson and Sil-Flux, the four parts were joined simultaneously in just 60 seconds!

For dependable, economical mass production metal joining, with *highest* possible strength at *lowest* practical temperatures, specify L.T.* brazing—and for L.T.* brazing alloys . . . specify the best: Phoson or Sil-Bond with Sil-Flux.

**Low Temperature*

CALL YOUR UNITED WELDING SUPPLY DISTRIBUTOR

UNITED WIRE AND SUPPLY CORPORATION

PROVIDENCE 7, R. I. OFFICES IN PRINCIPAL CITIES

VISIT BOOTH 305, AWS WELDING SHOW, APRIL 9-11, 1957, CONVENTION HALL, PHILA., PA.

Circle No. 88 on Reader Service Card.

Aluminum Soldering Sheet

Smooth and economical soldering of heat exchanger equipment is said to be possible with zinc-clad aluminum alloy now available in commercial quantities from Aluminum Company of America. Known as Alcoa soldering sheet, new material is said to make aluminum nearly as easy to solder as copper when specially developed techniques are used.

Material is fabricated with one or both sides clad, in coils or flat sheet form.

Circle No. 144 on Reader Service Card.

Add Iron Powder to Hard Facing Electrodes

Three new hard facing electrodes developed by Alloy Rods Co. take advantage of added speed and quality made possible with iron powder coatings. Wear-Arc 3 I.P. is recommended for build-up of worn parts, 6 I.P., which is said to have good resistance to abrasion, impact and compression, is for all-position work and 12 I.P. is used where extreme resistance to wear caused by heavy impact and abrasion is required.

Circle No. 7 on Reader Service Card.

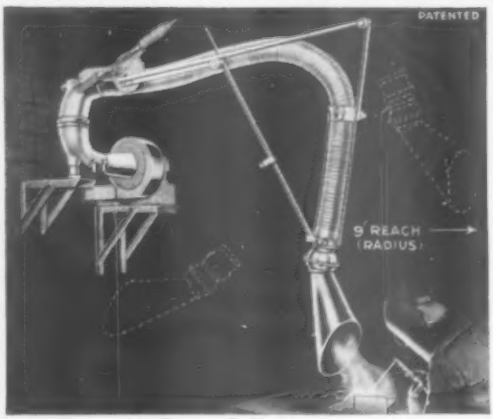
Weld Roll Planisher

A new weld roll planisher featuring rotating heads is announced by Airline Welding & Engineering Co. These heads can be turned 90° and locked in position for planishing circumferential and longitudinal welds. Vise-type locks hold upper and lower heads in position.

This 6½-ton planisher has a 72-inch throat. Pressures up to 10-tons and up to 96-inch throat depth are available. Upper head is power-driven by geared head motor and chain drive. A traveling backup attachment is supplied for small tube weld roll planishing.

Circle No. 145 on Reader Service Card.

REMOVE WELDING FUMES at the Source— with RUEMELIN FUME COLLECTOR

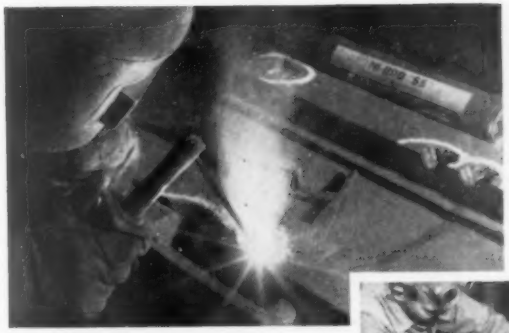


Ruemelin Fume Collector in operation.

Welding shops equipped with Ruemelin Fume Collectors are assured of a clean shop atmosphere. Noxious fumes, heat and smoke are eliminated AT THEIR SOURCE. Improves working conditions . . . lessens fatigue . . . paves the way for increased plant production. Especially helpful in winter months when windows and doors are closed. Note the new spring-loaded counterbalance mechanism which makes Fume Collectors much easier to handle. Ask for Bulletin 37-E illustrating this new feature.

RUEMELIN MFG. CO. 3891 N. PALMER ST. • MILWAUKEE 12, WIS., U. S. A.
Mfrs. and Engineers • Sand Blast and Dust Collecting Equipment

Circle No. 72 on Reader Service Card.



← Fast salvage of castings—Ready for the junk pile, this 600-lb. water pump casting looked like a complete loss. But the foundry repaired it with only 7 lbs. of Ni-Rod "55" electrode. The job took 1½ hours—saved a $260 casting.

Easy repairs—Dredged up → from the bottom, a rock broke through the side of this 4,200-lb. semi-steel dredge pump casing. A weldor using Ni-Rod "55" electrode welded a patch over the break, put $1,500 casting back on the job.

Proved on job after job: Ni-Rod and Ni-Rod "55" weld cast irons easily!

Over the entire range of profitable cast iron welding — from field repairs to production work — Ni-Rod* and Ni-Rod "55"* electrodes simplify the weldor's job.

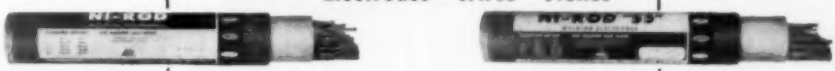
These easy handling electrodes team up high-nickel core wire with special flux coatings to give stable arc . . . smooth bead contour . . . easy slag removal . . . *strong, sound, machinable welds.* And preheat or post-heat is seldom needed.

Want more information about successful cast iron welding? Write for our folder called "Repair Cast Iron Parts Quickly and Easily." It's filled with *many* informative case histories.

*Registered trademark

The International Nickel Company, Inc.
67 Wall Street New York 5, N. Y.

INCO TRADE MARK **Welding Products**
Electrodes • Wires • Fluxes



Circle No. 47 on Reader Service Card.

"Airco 312 Electrodes are my choice for hard-to-weld steels"

The Airco 312 is an all-position mild steel electrode designed to produce weld metal possessing not only excellent mechanical properties but also low hydrogen content. The arc action is relatively quiet, resulting in low spatter. The molten steel is not turbulent. For welding steels when the exact composition is not known.

This is but one of many electrodes in Airco's complete line that also includes stainless steel, hard-facing, cast iron, general and special purpose electrodes. Send for the free Airco Electrode Guide which will help you select the right electrode for your specific job. Request catalog 1318-IW.

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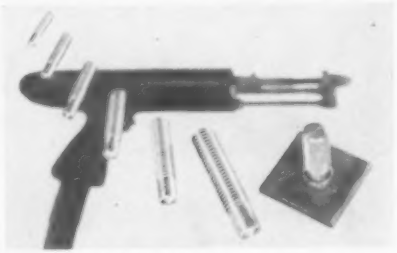
Circle No. 5 on Reader Service Card.

Threaded Welding Studs

A new type granular-fluxed welding stud has been introduced by Nelson Stud Welding Division of Gregory Industries, Inc. The new CP studs are said to have higher tensile properties and better welding qualities than former



standard MG studs.

New CP studs can be used with same templates used with MG studs, up to and including ½-inch diameter.

Circle No. 146 on Reader Service Card.

Improved Welding Shield

A durable, all-purpose heat fabric is now being used in Spa-Fla portable welding shields made by Frommelt Industries. The new Ray-Tex fabric used is said to offer positive resistance to high radiant heat, hard usage, dirt, oils, greases, water and to most acids and alkalies.

Easily rolled and carried, shields weigh less than 20 lbs.

Circle No. 147 on Reader Service Card.

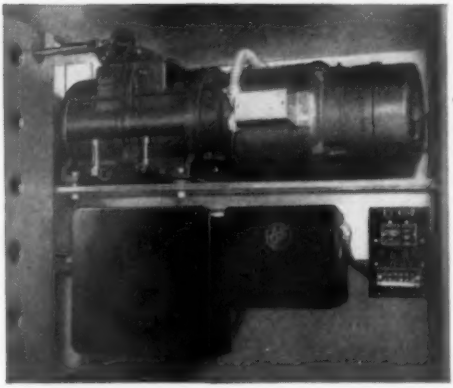
Electro Magnetic Drill Press with Automatic Power Feed

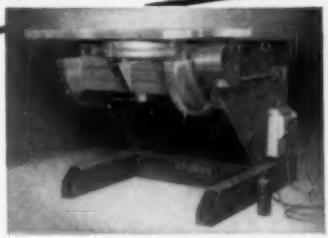
A new feature has been added to the versatile drill press manufactured by Portomag, Incorporated. While the Electro Magnetic base holds the drill press in position, Power Feed permits operator to advance drill to center-punch mark . . . turn on automatic feed . . . and let the drill do the rest. The new combination will drill up to 1¼" and tap 1" holes accurately, and is said to increase production many times over previous methods.

Circle No. 148 on Reader Service Card.

MAGNETIC BRAKE on TABLE ROTATION

Is STANDARD EQUIPMENT at no extra charge when you Buy ARONSON Precision Gear Driven POSITIONERS.





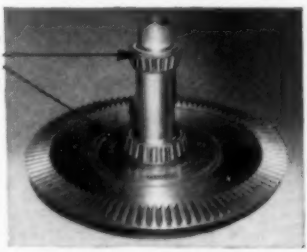
MAGNETIC BRAKE Built-In, gives smooth, exact stops for Table Rotation. No jockeying, forward and reverse, to get your weldment in Exactly the position you want. No danger to work and worker from overcoasting.

TEST FOR ACCURACY OF STOPS, 6000 LB. POSITIONERS Degrees Table Rotation After Pushing STOP Button:			
At 1 RPM Table Speed	Full Load	1/2 Load	No Load
WITH Magnetic Braking	2.6°	2.8°	3.0°
Without Magnetic Braking	12.7°	13.4°	15.2°

If any positioner **without** Magnetic Braking stops quicker than this test shows, that is a sign of too few Anti-Friction Bearings and not enough precision in its gearing. This condition causes too much drag and too much wear—a short life.

ARONSON MACHINES are 100% equipped with Ball Bearings or Timken Taper Roller Bearings — No Plain Bushings to wear out or require frequent servicing and periodic replacement.

All Gears Used in ARONSON Positioners are Precision Gears with High Strength — Low Friction.



Quality POSITIONERS by **Aronson MACHINE COMPANY**
ARCADE, NEW YORK

See the Ultimate in Geared Elevation Positioners in Booth 434 at the A.W.S. Welding Show, April 9-11. Philadelphia.

Circle No. 16 on Reader Service Card.

Extensive clean-up time, waste of costly alloy, unacceptable parts—these were the production slow-downs caused by a conventional high heat soldering material (left, above). To overcome them, an electronics manufacturer selected Eutec-SilWeld 1618, convenient paint-on solder paste. A high silver content alloy blended with special flux, Eutec-SilWeld 1618 bonds at low heat without fusion of base metal, combines high strength with 25% faster wetting and superior capillarity. Eutec-SilWeld 1618 has pushed production up, manufacturer gets fast, clean, strong joints.

Eutec-Silweld 1618 is only one of the more than 150 research-produced Eutectic "Low Temperature Welding Alloys"® that minimize or completely eliminate warping, distortion, stress, and embrittlement of base metals caused by conventional high heat welding materials Accept only genuine Eutectic "Low Temperature Welding Alloys."®

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® Registered Trade Mark of:

EUTECTIC WELDING ALLOYS CORP.
40-40 172nd Street, Flushing 58, N. Y., N. Y.

Circle No. 35 on Reader Service Card.

HF Motor Generators

A new line of vertical motor generators for induction melting, heat-treating and brazing has been introduced by Welduction Corporation. Generator ratings from 10 to 250 KV outputs are available in frequencies of 1,000, 3,000 and 10,000 cycles per second. Others are available on request.

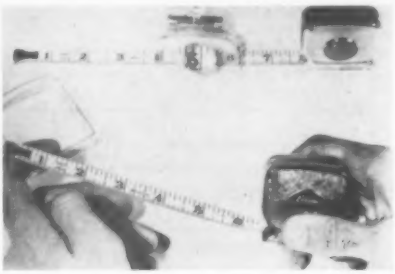
Among important features claimed for the new line are rapid power output changes, improved regulations, bearings free from possible induced heating, ease of maintenance and several protective provisions.

Circle No. 149 on Reader Service Card.

New "Power-Tape"

A new pocket-size steel white-tape designed with a ½-inch blade that may be automatically returned to its case under full controlled speed has been introduced by Evans Rule Co.

Each "Power-Tape" is packaged in a transparent box which has a tongue-



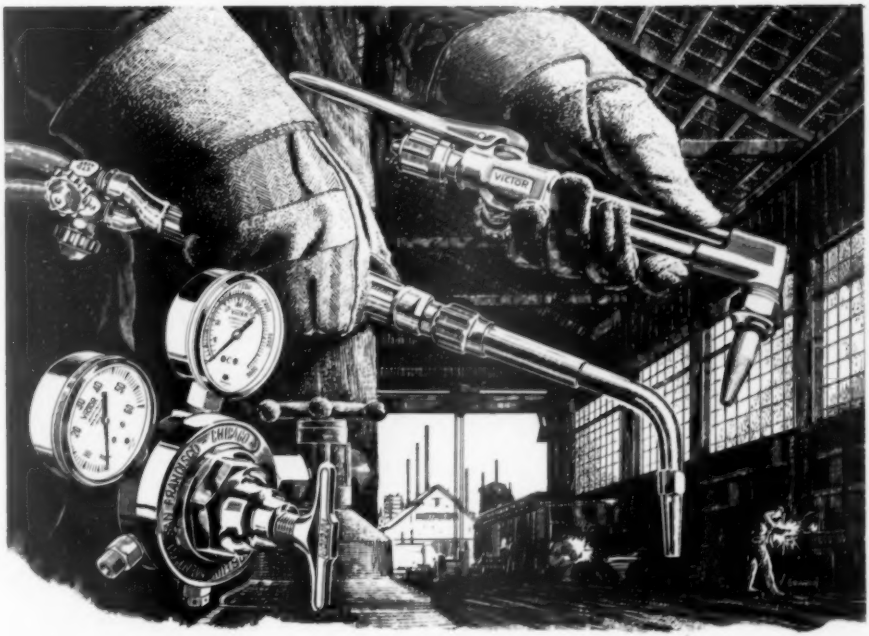
like projection—with a hole near its end—that permits user to hang up tape for ready accessibility in work area. In addition, box features a built-in magnifying lens on the lid.

Circle No. 150 on Reader Service Card.

E-6012 Electrodes

Designed for fast production and fabrication welding, a-c or d-c all-position operation, Hobart 212 manufactured by Hobart Brothers Co., doubles as a rod for poor fit-up work and for maintenance welding. Said to be easy to use and a low spatter-producer, even at higher amperages, 212 deposits a smooth, uniform convex bead. Comes in standard sizes.

Circle No. 151 on Reader Service Card.



the most flexible tools in the metal working industry

VICTOR COMBINATION WELDING AND CUTTING UNITS

FOR EASE OF HANDLING DIFFERENT JOBS . . . Welding, brazing, hardfacing, heating, heat treating, descaling and paint burning. Cutting, trimming, deseaming and weld scarfing.

WITH A WIDE VARIETY OF NOZZLES, TIPS AND CUTTING ATTACHMENTS, with quick-change, hand-tight, time tested sealing ring connections.

RELIABLE FIELD-PROVED REGULATOR DESIGN for safe, dependable pressure and flow control.

See for yourself how easy it is to handle your work when you use Victor equipment. Ask your Victor dealer for literature or a demonstration.

VICTOR for welding

See us at Booth 522, A.W.S. Philadelphia 36

VICTOR EQUIPMENT COMPANY

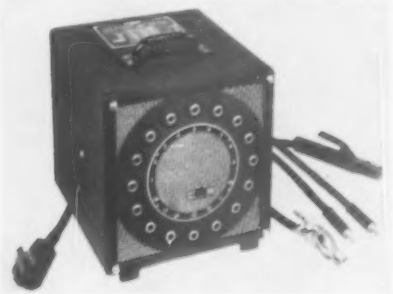
Mfrs. of welding & cutting equipment; hardfacing rods, blasting nozzles; cobalt & tungsten castings; straightline and shape cutting machines.

844 Folsom St., San Francisco 7 • 3821 Santa Fe Ave., Los Angeles 58

Circle No. 90 on Reader Service Card.

Portable Arc Welder

A hand portable industrial arc welder of 200 ampere output has been introduced by Brennen, Bucci & Weber, Inc. Weighing only 80 lbs., model 200B is fan-cooled for production use and is equipped with a thermal overload switch to prevent transformer burnout.



Welder employs a new, high efficiency transformer which is said to enable it to perform the work of a conventional arc welder four to five times its size and weighing three times as much.

Unit will weld steel 1½-inches thick and cut steel ¼-inch thick. Its overall dimensions are 12 by 13 by 14-inches.

Circle No. 152 on Reader Service Card.

Add Easy Release to Welding Clamps

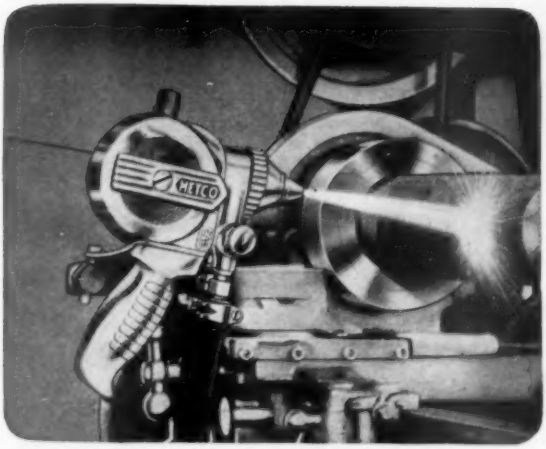
An easy release bar located just inside the lever has been added to Vise-Grip welding clamps made by Petersen Mfg. Co. Called Easy Release, the improvement operates in the normal opening direction, same as pliers. By simply pressing the release bar with light thumb or finger pressure, jaws spring open,

even when locked onto work with up to 2,000 lbs. pressure.

Other Petersen tools equipped with new release feature are Vise-Grip wrenches, C-clamps and sheet metal tools.

Circle No. 153 on Reader Service Card.

Circle No. 81 on Reader Service Card.

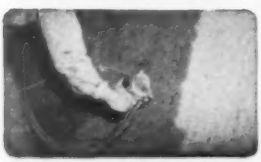


here's a really low-cost metallizing installation...

with the Metco L-Gun

Metallizing damaged journals on turbine shaft

Building up worn brake-drum



Metallizing protective coating on steel plate

New, low, compressed-air requirements... only 10 cfm at 40 to 60 psi, already available in many shops, or supplied by inexpensive 3 hp compressor... bring metallizing within reach of the small user.

Here's a chance for the smaller maintenance shop to get into profitable metallizing operations like these:

- Save up to 90% of replacement costs on machine repair jobs,
- Do your own hard-facing,
- Apply long-wearing corrosion-resistant coatings to exterior plant structures, tanks and other equipment.

Sprays 23 Different Metallizing Wires—With the new L-Gun you can spray .10, .25, .80 carbon steels, stainless; babbitts, brass, bronze; nickel, aluminum, tin, zinc; special hard-facing materials such as Metco-Weld H, and the new self-bonding Spraboad wire.

It's Versatile—Use the L-Gun machine-mounted or hand-held—it weighs only 4 lb. 2 oz. Do all kinds of metallizing work—shaft and bore build-up with harder, longer wearing metals; build up worn pump plungers, crankshafts, motor shafts; apply corrosion-resistant coatings. There are hundreds of different jobs that are "naturals" for metallizing.*

Same High Quality as Other Metco Guns—The low air requirements of the new L-Gun have been achieved without any sacrifice in Metco quality. It embodies new developments in turbine and nozzle construction—is built, like all Metco guns, for rugged, dependable service.

A Real Opportunity for the Smaller Shop—Thousands of large, well-known companies have been metallizing users for many years, not only in maintenance but in production applications on original equipment. Now, with the development of the new L-Gun, and a low cost installation, metallizing is within the reach of even the smallest plant. (We'll be glad to send you the names of some Metco users—large and small.)

Free Bulletin or Shop Demonstration—Send off the coupon for the detailed information Bulletin 55 gives you. Or, better still, ask for a demonstration in your own shop by a Metco Field Engineer. He'll be glad to show you how the new Metco L-Gun works on some job of your own. No obligation, of course.

The following names are the property of Metallizing Engineering Co., Inc.: Spraboad Wire, Metco-Weld, Metco®. *Reg. U.S. Pat. Off.

Metallizing Engineering Co., Inc.
1125 Prospect Ave., Westbury, L. I., New York • cable: METCO
In Great Britain:
METALLIZING EQUIPMENT COMPANY, LTD.—Chobham near Woking, England

DON A. WATSON
METALLIZING ENGINEERING CO., INC.
1125 Prospect Ave., Westbury, Long Island, N. Y.

☐ Please send me more information about metallizing.
☐ Please arrange a demonstration in my shop.

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Company_____
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Tempilstik°

FOR ALL HEAT-DEPENDENT OPERATIONS

looks like a crayon...
marks like a crayon...
tells temperatures like a precision instrument!

Sixty-three different compositions enable you to determine and control working temperatures from 113° to 2000° F. TEMPILSTIK° marks on workpiece "say when" by melting at stated temperatures—plus or minus 1%.

ALSO AVAILABLE IN LIQUID AND PELLET FORM... WRITE **SALES DEPT.** FOR SAMPLE TEMPIL° PELLETS... STATE TEMPERATURES OF INTEREST—PLEASE!

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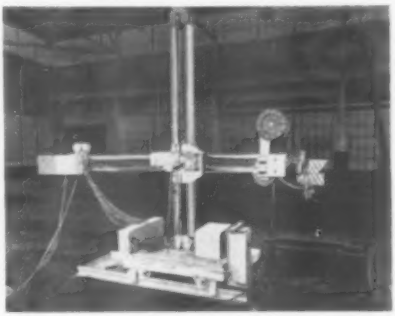
NEW YORK 11, N. Y.

Visit us at Booth 629—April 9-11
Welding Show—Philadelphia, Pa.

Circle No. 85 on Reader Service Card.

Portable Welding Manipulator

A track-mounted manipulator designed for automatic welding of bulky products, yet capable of welding inside 24" diameter pipe, has been announced by Worthington Corporation. Machine has a 10' vertical range, 12' or more horizontal travel with multiple track sections, and 360° mast rotation. Michigan Tool Company's Cone Drive speed reducers

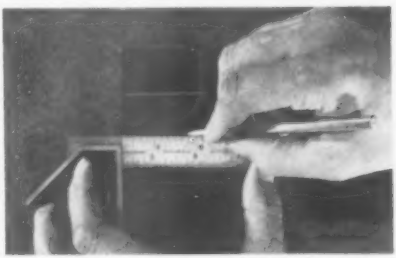


are incorporated to obtain smooth, compact, maximum rating operation with little maintenance at 0 to 100 ipm and rapid traversing. Machine takes standard welding equipment.

Circle No. 154 on Reader Service Card.

Lightweight Scriber

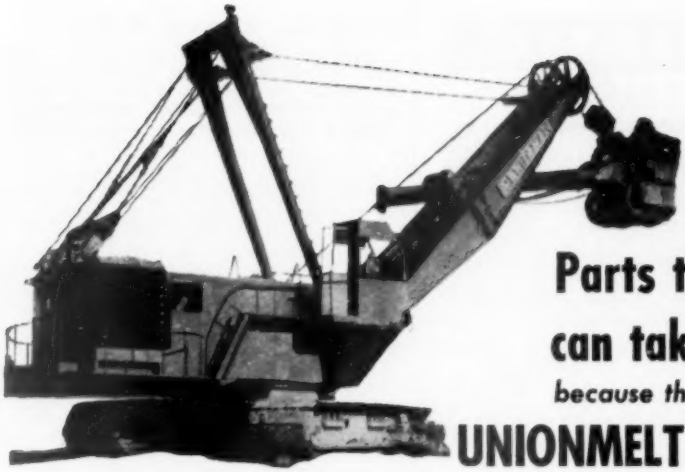
Designed for faster marking, a lightweight tool, called Micro-Scriber, can be used to scribe or etch all metals, including hardened steel, aluminum, cor-



rugated sheet, brass, bronze, Monel, and precious gems, glass, ceramics and plastics.

Introduced by Greist Mfg. Company, tool has a solid carbide tip which is diamond ground and precision lapped. Tool has polished aluminum handle which is hexagonal in shape to prevent its rolling.

Circle No. 156 on Reader Service Card.



Parts that can take it...

because they're

UNIONMELT Welded

A power shovel dipper stick has to be strong. It must withstand severe banging, twisting, and bending stresses as its huge scoop bites out hundreds of tons of earth and rock in each day's operation. But these dipper sticks can take it—they're made by UNIONMELT welding.

Strong, clean UNIONMELT welds can be made in metals up to 3-in. thick in a single pass. There is no limit to the metal thickness that can be joined by multiple passes.

Whatever your fabricating needs are, for small shops or huge production lines, from carbon steel to complex alloys—LINDE has an electric welding process to do the job. Your local LINDE representative will help you determine the best welding process for your job. Call him today for more information.

Dipper sticks have to be strong to absorb severe stresses. That's one reason why the three main sections of this part are UNIONMELT *welded.*

LINDE AIR PRODUCTS COMPANY

A DIVISION OF UNION CARBIDE AND CARBON CORPORATION

30 East 42nd Street, New York 17, N. Y. UCC Offices in Other Principal Cities

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Division of Union Carbide Canada Limited, Toronto

"Unionmelt" and "Linde" are registered trade-marks of Union Carbide and Carbon Corporation.

Linde Trade-Mark

Circle No. 56 on Reader Service Card.

"EUTECTIC"

"UN-BREAKABLE"

ALUMINUM WELD

Aluminum tines on this cement block unloader dip eight inches under loads of close to a ton — without cracking. Welded with EutecTrode 2101, tine joints are up to three times stronger than joints of conventional aluminum electrodes. Patented EutecTrode 2101, first aluminum electrode with extruded flux coating, does not spatter or fume, produces quiet, easy to maintain arc at lowest amperages. Deposits are smooth and solid, have good color match and high resistance to corrosion. EutecTrode 2101 out-performs all conventional aluminum electrodes, makes welding aluminum as easy as welding mild steel

EutecTrode 2101 is only one of more than 150 research-produced Eutectic "Low Temperature Welding Alloys"® that minimize or completely eliminate warping, distortion, stress, and embrittlement of base metals caused by conventional high heat welding materials. Accept only genuine Eutectic "Low Temperature Welding Alloys".®

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WELDING ALLOYS

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Circle No. 36 on Reader Service Card.

"Tune-In" Control Welder

Addition of Arc Characteristic Control for obtaining best results in weld soundness on different kinds and thicknesses of metals has been announced by Metal & Thermit Corp. A tapped phase-

shifting device controls the arc by means of a selection switch which permits greater range of current density with a given electrode. Correct density can be "tuned-in" to provide stable spray-type deposit in manual, automatic or semi-automatic welding.

Circle No. 61 on Reader Service Card.

Electrode Wheel Holder

Lower electrode wheel holder for resistance welding of large and heavy cone, cylindrical or flat weldments has

been developed by The Weldma Co. Advantages of this wheel holder, which is machined from RWMA Class 3 alloy and employs silver plated bearings for good thermal and electrical conductivity, is the reduction of frequent contour dressing and need for replacement of worn lower electrode tips resulting from

indexing rotation of heavy weldments. Supplemental water cooling is provided for workpiece and wheel.

Circle No. 157 on Reader Service Card.

Electronic Speed Control

Recently introduced by Weltronic Co. is their electronic adjustable speed DC drive which uses electronic tubes for rectification and utilizes the driving motor's counter EMF for speed control. Claimed for the new unit is closer speed control with minimum space requirements—the latter since tachometer and gearing are not required.

New control comes in five sizes from ¾ h.p. through 3 h.p. Each are said to provide stepless adjustment without field weakening from 35 rpm to 1750 rpm.

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USE THE READER SERVICE CARD FOR VALUABLE REFERENCE DATA

EXTRA LARGE...
Extra Comfortable!

No. 620

NEW SELLSTROM JUMBO WELDING GOGGLES

EXTRA is the word for these new Sellstrom Goggles. They're extra large (fit over glasses), extra comfortable in styling, extra cool (cross ventilated). Rigid brace bar permits raising with one hand. Try them soon . . . you'll like them. Ask for Sellstrom "620"

FLEXIBLE BRIDGE STYLES

Same extra size and comfort . . . with adjustable nose bridge.

No. 618

WRITE today for complete information and free literature.

SELLSTROM MANUFACTURING CO.

228 South Hicks Road Palatine, Illinois

SEE US! AWS SHOW Booths 206-208 (at the registration desk)

Circle No. 74 on Reader Service Card.

Pipe welding is really not as modern as most people think. It was used as far back as 79 A.D. by the ancient Romans. Here's the story on . . .

2,000 Year Old Welded Piping . . . Roman-Style

EVEN in the days of Pompeii welded pipe was stronger, more efficient and leak-proof.

Recent excavations at that ancient Roman city have unearthed an elaborate water piping system which contains what was probably the world's first welded pipe. Buried under ashes and lava by the famed eruption of Mt. Vesuvius in 79 A.D., the system, which contains such modern components as shut-off valves, is still in remarkably good condition.

The pipe was probably manufactured by a form of forge welding. Heated metal strips were hammered into circular form and filler metal strips of the same composition added to the longitudinal seams. This appears to have been done by heating filler metal to forging temperature and peening it into the joint. Result was a tight dense weld that has lasted to this day.

Shut-off valves designed for wrench or turn-bar operation are located on leads off the main pipe line.

A form of forge welding was used in fabricating this Roman piping system. Heated metal strips were hammered into circular form and joined by peening strips of filler metal into longitudinal seams. Note use of shut-off valve in photo at top.

FASTER . . . EASIER HARD SURFACING

Semi-Automatically With

Wear O Matic

PRECISION DRAWN HARD SURFACING WIRES

Now you can shorten "down-time" and turn out more resurfaced or rebuilt parts per shift with semi-automatic equipment and Wear-O-Matic precision drawn hard surfacing wires. With deposition rates up to 15 pounds per hour you can easily save up to 50% of the cost of manual hard surfacing operations and yet retain the flexibility of manual welding. In addition, with semi-automatic application there is no stub or coating loss.

***See semi-automatic demonstrations of Wear-O-Matic wire.* Visit Booth 101 at the AWS Welding Exposition, Convention Hall, Philadelphia.**

Here's why Wear-O-Matic is the RIGHT WIRE for your semi-automatic applications.

More uniform wear resistance Wear-O-Matic wires are compacted to a density almost equal to solid wire resulting in a more uniform hardness and wear resistance throughout the weld deposit.

Continuous smooth feeding The true diameter and dense structure of Wear-O-Matic wire permits smooth feeding without special feed rolls or contact tubes. Wear-O-Matic wires will not crush under standard feed roll pressure.

Find out now how Wear-O-Matic precision drawn wires can improve your hard surfacing operation. Write for free literature and application manual. Drawalloy Corporation, Lincoln Highway West at Alloy Street, York 11 Pennsylvania.

Drawalloy

CORPORATION

YORK, PENNSYLVANIA

THE WIRE MILL FOR THE WELDING INDUSTRY — STAINLESS STEEL · HARD SURFACING · TOOL STEEL

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Well over 200 persons attended the third annual Midwest Welding Conference held recently in Chicago under the joint sponsorship of the Research Foundation of Illinois Institute of Technology and the Chicago Section of the American Welding Society.

George Linnert, 1956 American Welding Society Adams Lecturer, was one of the principal speakers. Mr. Linnert discussed welding of stainless steel.

Harry Schwartzbart acted as Conference Chairman. Mr. Schwartzbart is with Armour Research Foundation of Illinois Institute of Technology.

Hold 3rd Midwest Welding Conference

USE of welding in the rapidly growing nuclear reactor field was high lighted at the 3rd annual Midwest Welding Conference held in Chicago on January 30 and 31. The conference is sponsored annu-

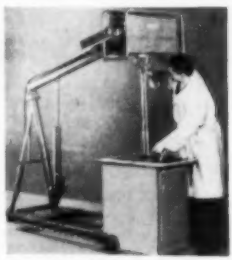
ally by Armour Research Foundation of Illinois Institute of Technology and the Chicago Section of the American Welding Society.

One of the featured speakers was George Linnert, research welding metallurgist, Armco Steel Corp. Mr. Linnert, who was the 1956 American Welding Society Adams Lecturer, explained how to get trouble-free service from stainless steel weldments.

X-RAY UNIT YOU, TOO, CAN AFFORD TO "WEAR"

Complete Baltospot X-ray unit—X-ray head, cables and control panel—costs less than $2900. Head weighs only 47 pounds, yet has rating of 140,000 volts and penetration up to 1½" of steel. Applicable to most X-ray inspection jobs, the Baltospot is the most powerful unit for its weight available. Dust-sealed, shock-proofed, moisture-proofed. USE PROVEN. Write for details.

OTHER UNITS rated 120, 160, 180, 200 and 260 KV for portable or stationary inspection of material from thin aluminum to 4" of steel. BG 180 for 360° radiography.



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New and Meadow Streets, Stamford, Connecticut

Manufacturers of DIFFERENT X-Ray Equipment for Industry and Medicine

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Officers of Los Angeles Section, American Welding Society plan AWS five-day technical program. They are, left to right, C. B. Smith, chairman, Charles W. Concannon, chairman of AWS Metal Congress program committee, John R. Ross, secretary-treasurer and David P. O'Connor, vice chairman.

AWS Sponsors Nine Technical Sessions

All phases of welding activity will be featured in nine specially planned technical sessions of the American Welding Society to be held in conjunction with A.S.M.'s 10th Western Metal Congress, March 25-29, in the Ambassador Hotel, Los Angeles.

In conjunction with the Congress, the 10th Western Metal Exposition will be held in the Pan-Pacific Auditorium and in specially erected outdoor pavillions.

Among the important talks to be given during the five-day AWS technical session are: "Today's Field Welding of Pressure Piping in the Refinery, Power and Pipeline Industries," A. M. Croswell, senior welding engineer, Bechtel Corp., "Ultra-High Strength Weld Metal for Aircraft Fabrication," D. C. Smith, chief metallurgist, Harnischfeger Corp.

"An Evaluation of Filler Metal for Use on High Strength-Low Alloy Steels," Frank G. Harkins, chief process engineer, Solar Aircraft Co., "A New CO-2 Welding Process," A. F. Chouinard, research and development engineer, and R. T. Monroe, manager of technical

Welding Exhibitors at Western Metal Show

Ajax Engineering Corp.
Allegheny Ludlum Steel Corp.
American Brass Co.
American Chain & Cable Co., Inc.
American Chain & Cable Co., Inc. Allison Division
American Platinum Works
American Pullmax Co., Inc.
American Welding Society
Ampco Metal, Inc.
Arcair Co.
Baldwin-Lima-Hamilton Corp.
Bausch & Lomb Optical Co.
Beaver Tool & Engineering Corp.
Black & Decker Mfg. Co.
Braeburn Alloy Steel Corp.
Branson Instruments, Inc.
Buck Mfg. Co.
Budd Co.
Burdett Oxygen Co.
California Alloy Products Co.
Challenge Machinery Co.
Chase Brass & Copper Co.
Clementina Ltd.
Crucible Steel Co. of America
Delta Power Tool
Detrex Chemical Industries, Inc.
Detroit Stamping Co.
Diversey Corp.
Dow Chemical Co.
Eastman Kodak Co.
Eutectic Welding Alloys Corp.
Fibre-Metal Products Co.
General Electric Co., X-Ray Dept.
Handy & Harman
Harnischfeger Corp.
Heath Engineering Co.
Hobart Brothers Co.
Hoeganaes Sponge Iron Works
Holger Andreasen, Inc.
International Nickel Co.
Jones & Laughlin Steel Corp.
K-S-M Products, Inc.
Kennametal, Inc.
King Tester Corp.
Latrobe Steel Co.
K. O. Lee Co.
Leeds & Northrup Co.
Lincoln Electric Co.
Lindberg Engineering Co.
Lufkin Rule Co.
Magnaflux Corporation
Magnetic Tool Corp.
Markal Company
Merit Products, Inc.
Metal & Thermit Corp.
Met-L Chek Co.
Miller Electric Mfg. Co.
National Torch Tip Co.
National U.S. Radiator Corp.
Natural Gas Equipment, Inc.
National Cylinder Gas Co.
North American Philips Co.
Norton Company
Oakite Products, Inc.
Ohio Crankshaft Co.
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Portomag, Inc.
Raytheon Mfg. Co.
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Skil Corp.
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Standard Electrical Tool Co.
Steel City Testing Machines, Inc.
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Tempil Corp.
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Turco Products, Inc.
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Vandium-Alloys Steel Co.
Vickers, Inc.
Victor Equipment Co.
Wall Colmonoy Corp.
Wells Manufacturing Corp.
West Point Mfg. Co.
Westinghouse Electric Corp.

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108-R North Water St., Milwaukee 2, Wis.

service, National Cylinder Gas Co., "Constant Voltage Type Welders and their Application," L. P. Henderson, welding engineer, M & T Welding Products Corp.

"Welding for Nuclear Pumping Applications," Frank R. Drahos, chief metallurgist, Byron Jackson Co., "Evaluation of Hardfacing Materials," Dave Rankin, president Rankin Manufacturing Co., "Weldability of High Temperature Alloys," R. P. Culbertson, head, process development section, Haynes Stellite Co., and "Selection of the Proper Inert Gas Shielded Arc Welding Process."

Technical programs also are scheduled by American Society for Metals, Society for Nondestructive Testing, American Institute of Mining, Metallurgical and Petroleum Engineers—Metals Branch, and Industrial Heating Equipment Association.

For Valuable Reference Material Available At No Charge See Page 30.

REPAIR WORN TRUCK BEDS, SCRAPERS AND CHUTES

With Tuf-a-brase Alloy Wear-Resisting Plate

A tough, long wearing plate of special alloy steel for repairing truck and trailer beds, chutes, scoops, bang boards and other equipment subject to abrasive wear and shock. In stock sizes of 4', 5', 6' widths x 4', 8', 10', 12', and 20' lengths. Thickness range from 3/16" to 1-1/2".

Sales Representative and Distributor Inquiries Invited

ALLIED STEEL & TRACTOR PRODUCTS, INC.
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Union Carbide Plans New Facilities

Union Carbide & Carbon Corp. has completed construction plans for its 280-acre site near Tarrytown, N.Y. Structures planned include an office building for sales departments of several division and basic research and customer research laboratories.

Construction is expected to begin early in 1957 and be completed early in 1959.

United Specialties Names Distributors

Six new distributors have been named to handle a complete line of reels for welding hose and cable manufactured by United Specialties, Inc. They are Cardinal Co., Inc., Terre Haute, Ind., Lex Co., Inc., Evansville, Ind.; O. E. Meyer & Sons, Inc., Sandusky, Ohio; Atlantic Gasflux Co., Mt. Vernon, N.Y.; Atlantic Cylinder Corp., Brooklyn, N.Y.; and Duvall Welding Supply Co., Jacksonville, Fla.

Adams National Dinner

An "Adams National Dinner" will highlight the Spring Meeting of the American Welding Society, Philadelphia, April 8-12. To be held immediately following the President's reception the evening of April 8th at the Sheraton Hotel, dinner will honor Comfort Avery Adams, founder and first president of the A.W.S.

Tickets are available for individuals or table groups. Orders are being accepted by Robert S. McCracken, R. S. McCracken & Sons, 636 N. 13th Street, Philadelphia 23.

OXO

Welding and Cutting REGULATORS

New Exclusive Design

Underwriters Laboratories Approved (Patents Pending)

New OXO regulators are adaptable for every welding and cutting need where precise and constant working pressure and volume are a requirement. Rugged built to "take it" construction, long life, safe and trouble-free operation, ease of repair and fine sensitivity makes OXO regulators your best buy.

- Protected gauges
- Stainless steel working parts
- Nozzle, seat and filter in one unit
- Built-in check shock
- Stainless Micro filter
- Only one size socket wrench necessary to effect complete change of working parts.

WRITE FOR DETAILS:

OXO Welding Equipment Company | CEDAR & OAK STREETS NEW LENOX, ILLINOIS

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Amperex Guarantees Welder Ignitrons

Amperex Electronic Corporation has announced that their line of welder ignitrons now carries a 24-month service period warranty. According to Charles Roddy, manager of the Amperex Industrial and Communication Tube Division, this is the first time in the history of the industry that any manufacturer has deemed it feasible to guarantee welding ignitrons for such an extended period.

Form Western Sales Co. in Northern California

Establishment of Western Sales Co. of S. F. has been announced by Lowell R. Fletcher. Located in Carmel Valley, Calif., the firm acts as steel brokers and as manufacturer's representatives for several industrial lines.

According to Mr. Fletcher, firm is interested in taking on additional industrial, construction or welding lines.

WHEN YOU BURN OFF GALVANIZING

RE-GALVANIZE with Galvalloy

WILL
- BOND QUICKLY
- BOND PERMANENTLY
- BOND TO MOST METALS
- WITHSTAND 30 DAY SALT TEST

NO
- FLUX
- SANDBLASTING
- CLEANING

WON'T
- PEEL OFF
- BURN OFF
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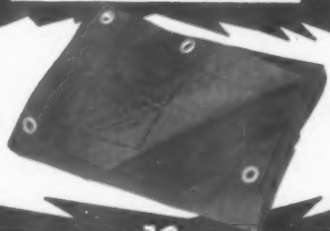
CONFINE YOUR DANGER!



USE Reeves FIRE CHIEF TREATED WELDING CURTAINS

- close woven canvas
- weighs 10 ounces per square yard before treatment
- impregnated with Hooper's Fire Chief treatment under their patent
- Underwriters Laboratory approved

The perfect protective curtain for all your dangerous work.

A. SMITH & SON, INC.
"IF IT'S MADE OF CANVAS, WE MAKE IT"
Green & Ridge Ave. Philadelphia 23, Pa.

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Circle No. 27 on Reader Service Card.

Wolfenden Welding Wins

Volume Sweepstakes award for 1956 is presented to Wolfenden Welding Supplies, Inc. by E. A. Hobart, President of Hobart Brothers Co. (Left to right) Bill Wolfenden, John T. Wolfenden, Jr., and Mr. Hobart.

For the second consecutive year this Cleveland, Ohio firm has finished in first place among Hobart Bros.' distributors.

Second place went to H. K. Miller, Inc., Chicago, Illinois, and third place to Roy Smith Co., Detroit, Michigan.

FOR MORE INFORMATION
On any of the items described in our "New Products," "Useful Literature," "Advertisers' Literature" sections, use Reader Service Card bound in this issue.

IMPROVE WELDING QUALITY WITH THE **TONG TEST**

AC-DC AMMETER

Now you can measure actual AC or DC welding currents without losing valuable production time. The Columbia TONG TEST is simply clamped around the electrode cable. Instantly you get an accurate ampere reading to control and maintain welding quality. Interchangeable ranges available up to 1000 amperes.

Eliminate defects . . . increase production . . . maintain valuable equipment with the low-cost Tong Test Ammeter. Write today for 8-page Catalog **IW-400.**

Only Tong Test Measures Both AC and DC

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COLUMBIA ELECTRIC MFG. CO.
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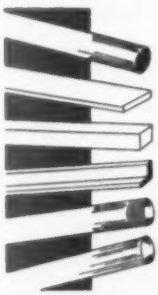
BENDS ALL THESE:



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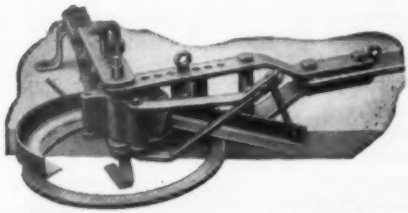

HOSSFELD UNIVERSAL® IRON BENDER

• Wrenchless, ready to use. • Practical, quickly set up. • Adaptable, replaces special equipment. • Versatile, 141 different dies available. • Dependable, a must for maintenance, limited production. • Invaluable, optional equipment makes jobs easier.

FREE: WRITE FOR BULLETIN

HOSSFELD MFG. CO.
436 W. Third Street, Winona, Minnesota

Circle No. 45 on Reader Service Card.

CO_2 WELDING

(Continued from Page 81)

creased metal deposition rates and increase in penetration resulting from low popping agitation-type of arc that is charactertistic of welding grade carbon dioxide.

At the same time, this new technique permitted greater operator control, minimized need for rework and greatly improved appearance of the welds.

Since arc control is the key to quality, the need to properly control spatter, weld bead and consistency of penetration, indicated that conventional welding equipment did not give satisfactory results. The end result was a constant voltage motor generator power, unit, simplified constant speed wire feeding device, proper welding grade CO_2, regulating equipment and manual gun with built-in finger tip control.

Optimum specification for this type of operation proved to be 35 cubic feet per hour of carbon dioxide and a speed of 500 ipm of an approved-type CO_2 welding wire with an arc voltage of approximately 42 volts at 500 amps.

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Stettner Receives Morehead Medal Award

Presentation of the 1956 Morehead Metal Award to L. W. Stettner, president of Victor Equipment Co., Los Angeles, Cal., will highlight the 57th annual International Acetylene Association convention to be held in Minneapolis, Minnesota, April 1st through 3rd. Award will be presented to Mr. Stettner at the Association's annual banquet, Tuesday evening, April 2nd.

Medal is presented annually to the person or persons who have done the most to advance the industry or the art of producing or utilizing calcium carbide or acetylene.

Keynote speaker at the affair's opening luncheon on Monday, April 1st, will be the Honorable George C. Marler, Canadian Minister of Transport, who will discuss "St. Lawrence Navigation and Power Project."

Moderator will be Airco's Dr. G. V. Slottman, winner of the 1955 Morehead Medal Award.

Full coverage of this important affair will appear in INDUSTRY & WELDING Magazine for April, 1957.

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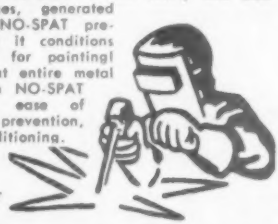

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Kibby Joins Lauter

William J. (Bill) Kibby is now associated with Ernie Lauter, Cleveland District representative for Link Welder Corp. of Detroit, Michigan.

Kibby, who has been connected with the resistance welding field for the past 10 years, has a wide background in fabrication of ferrous and non-ferrous materials.

Cleveland offices are maintained at 2000 Center Street, Cleveland 13, Ohio.

RPI Studies Zirconium

Dr. Ernest Nippes, director of welding research at Rensselaer Polytechnic Institute, has opened a new program of research for studies of the welding Zircaloy 3, a zirconium alloy. Three resistance welding processes, spot, seam and flash welding, will be utilized in the course of the study.

The investigation will continue

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for a year. Sponsor of the research is the Atomic Power Division of the Westinghouse Electric Corp., Pittsburgh.

Wicker, Buechler Join Tube Turns Sales Staff

Arthur C. Wicker and Clarence M. Buechler are the two latest additions to the Sales Development Department of Tube Turns, Louisville, Ky. Announcement was made

WICKER

BUECHLER

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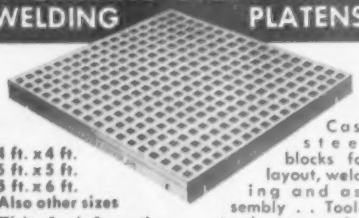

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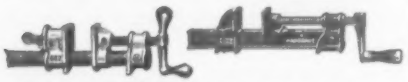

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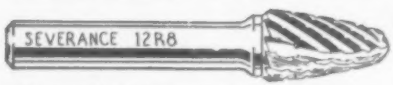

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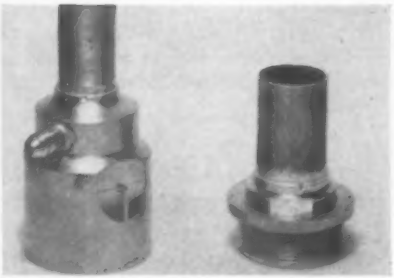

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The nickel-chrome brazing alloy used produces a joint having a tensile strength equal to that of the parent metal at temperatures up to 2000° F. Components were finish machined and threaded prior to brazing; this is possible because the method holds distortion to a negligible value.

Photo courtesy Stainless Processing Div., Wall Colmonoy Corp.

K-G Appoints Kordwitz

Norman M. Kordwitz has been appointed sales coordinator for the K-G Equipment Company, Allentown, Pa. The announcement was made by Karl Schmuldt, vice president of the company, a subsidiary of Air Products, Inc.

Prior to joining the company, Kordwitz held sales positions at Johnson & Johnson Co. and Minnesota Mining and Manufacturing Co.

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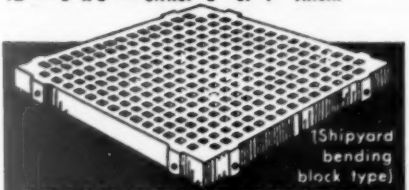

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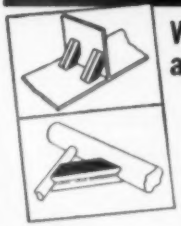

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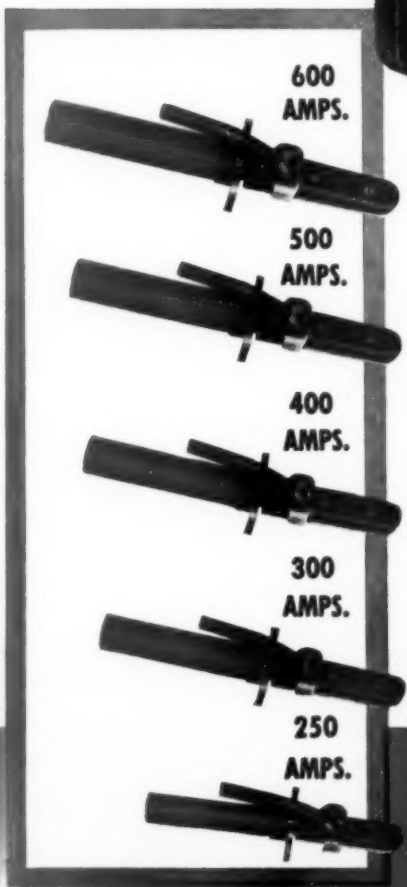

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